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Power Distribution from Central Stations.

AT the annual meeting of the Institution of Mechanical Engineers, just held, Mr. Joseph Parry, the Water Engineer to the Corporation of Liverpool, gave some interesting particulars of the recent endeavour of that Corporation to extend the area of operations of the water service by introducing a system of low-pressure power supply. Although the information given by Mr. Parry might have been cast into better shape, it is nevertheless valuable as giving authentic data on ordinary commercial working; which is a very different thing from trial-trip results. It may be stated that the average rate of water supply per head per day, for all purposes, is, in Liverpool, twenty-four and a quarter gallons.

The distribution of power from central stations is the coming engineering problem, for until we extend the "factory system," —the great modern illustration of the fable of the bundle of sticks,—to the production of power, our civilisation will have lagged behind in one important particular. Efforts are being made in this direction, but on a small and unimportant scale compared with the importance of the subject. Perhaps, however, these tentative methods are the best; certainly they are the safest. No one knows yet which is the best vehicle for power: steam, gas, water, air, or electricity. The New York installation is the most notorious effort made to use the former. Great things were expected of this, but it is a fact that about eighteen months ago there was something very like a howl of public indignation, ascending from the press and elsewhere, against this company; and that the way along the streets was frequently blocked by earth disturbances, which had every appearance of being due to boiling springs, but were in reality, we were informed, simply caused by the disrupted pipes of the steam-supply company's mains. Expansion and contraction of the mains through variations in temperature is a most fruitful source of trouble in steam distribution; condensation is another. The steam motor, too, gives off heat, and is ill-smelling. On the other hand, when steam has to be the prime source of power there is at least one conversion the less. Steam distribution from a central station does not, however, appear likely at present to be extended in this country.

Gas is, of course, at present the chief agent in the distribution of power from central stations. The great economy of the gas-engine has led to its introduction of late in many situations where a few years back it would have been looked upon as out of the question, even by the most staunch of its supporters for smaller uses. As an instance we may mention that one of the new machine shops at Armstrong's enormous works at Elswick is being run, or, at any rate, was to be run, entirely by gas-engines, and there are gas-engines at work of 170 indicated h.-p., the fuel consumption, it being claimed, being equal to 1 lb. of coal per hour per indicated h.-p. This, of course, is far ahead of anything yet done by the steam-engine. But these latter cases, after all, do not come under the category of "power distribution," for the engines are mostly supplied with Dowson gas, which, as is well known, is made in separate producers, just as, in the ordinary way, steam for engines is generated from separate boilers. Nevertheless, even when using the expensive illuminating gas of the companies, the gas-engine fairly holds its own in many positions. If the demand ever lead to the distribution of purely power or heating gas, then we may expect to see the gas-engine almost make a clean sweep (and, indeed, many other clean sweeps will be made if that time ever arrive); unless, of course, corresponding advances are made in other quarters. The gas-engine, however, is hot and malodorous, like its brother the steam-motor. It also makes a most irritating noise, and is difficult to start, but improvements have been made in the latter respect of late.

Distribution of power by hydraulic means has been successfully installed, notably in London; but the applications have been chiefly in passenger-lifts and the hoisting of goods. The great thing to be desired in the application of water power is a means by which the quantity of water used may be apportioned to the load. At present we know of no satisfactory device for compassing this end, or, we hasten to add,—with a wholesome dread of expostulation from the many inventors at work in this field,—we know of no satisfactory device the merits of which have been adequately recognised. A great struggle has been made lately by the advocates of the compressed-air system, and that struggle has ended in their defeat. Birmingham offers, perhaps, a more favourable field for the application of a power-distribution scheme than any other town or city in the kingdom, inasmuch as there are more small industries, using small motors, there than in any other equal area. In Paris, the Popp compressed-air system, first started for simply working clocks, has been a success. One chief point against compressed air is that in compression heat is given off, and in expansion heat has to be replaced. This, of course, represents a loss of efficiency, and, in some cases, much inconvenience through ice forming in the engine. In the Birmingham scheme an effort was made to get over this difficulty by heating the air before using by means of stoves which were fed by waste heat. This does not appear to have been very successful, and there were also serious troubles, owing to leakage in mains, due to expansion and contraction. It is but fair to compressed air, however, to say that those connected with the scheme complain that their hands were fettered by official restrictions. Whatever may be the merits of the case in this respect, the Birmingham failure cannot but be a serious discouragement to the advocates of this means of power distribution.

Electricity comes next on our list. Perhaps the safest thing to say about it at present is that it is too dear; but that is largely due to commercial or financial rather than physical causes. The Liverpool Electric Supply Company offer power at the rate of 5d. per indicated horse-power per hour. Such a price puts electricity out of the running, excepting for very small applications such as those of dentistry, sewing-machines, or other light and delicate applications. It may be said in favour of electricity that there is more

hope for improvement than in any other of the methods of distributing power above enumerated. We can see nearer to the end with water, steam, air, and gas,—we have named them in what we consider the order of precedence in this respect,—than we can with electricity. There is a vast undiscovered country round which thousands of able explorers are ever wandering, watchful and eager to obtain entrance. Let but one lucky individual, a Thompson, a Crookes, or a Tesla, find the pass, and the armies of applied science will flock in to conquer the domain for the occupation of industrial enterprise. As it stands, however, electricity offers an admirable means of power distribution. So much attention has been directed to its adaptation for lighting purposes, that its perhaps more important function has been neglected. The efficiency of the electric motor is very high, and it is a pity that even such knowledge as we have does not receive more frequent application.

To return to Mr. Parry's paper, which deals with Liverpool in particular, we find that in that city, steam, water, gas, and electricity have all been utilised, to a greater or less extent, for the distribution of power; but, up to the present, only water and gas have found any fairly extended practical application. The figures Mr. Parry quotes were obtained in the course of an investigation he made about two years ago for the purpose of reporting to the Corporation of Liverpool on a proposal of the Hydraulic Power Company to extend their mains outside of an area within which they had been allowed to supply power. Liverpool offers a favourable field for the application of the central station system, more especially in the working of cranes and lifts. The weight of goods handled in one year exceeds 14 million tons, and the work required for this is of an intermittent character.

The number of hydraulic machines now worked by direct pressure from the Corporations mains is 162. The Mersey Dock and Harbour Board have, of course, a system of their own. The majority of these motors are for lifting goods, but organ-blowers stand second on the list, so it will be seen that many of the installations are small; indeed, the total consumption of water per annum does not exceed 125,600,000 gallons, of which 118,000,000 gallons are used for lifts and elevators. The pressure varies from 50 lb. to 80 lb. per square inch. The great bulk of the loading and unloading is still done by steam; but gas-engines are coming into use, and are in some cases taking the place of steam. There are 650 now in use in Liverpool, of which city we are at present alone speaking.

The average amount paid per annum for working a goods hoist from the Corporation mains is 13*l.*, or 10d. per hoist per working day. With an available pressure of 60 lb. per square inch, properly utilised, and at the present rate of 7d. per 1,000 gallons, the cost of lifting is 1d. per 50 foot-tons. In cases where the waste water can be used there is an important saving in this respect; for instance, at the Exchange Station, the Lancashire and Yorkshire Railway Company work elevators and fill the boilers of their locomotives with the exhaust water. In a table Mr. Parry gives some figures which would be more valuable were there a little further explanation of the working conditions. We are told, however, that in the lifts instanced in this table counterbalance weights are not used, so that the weight of ram and platform has to be added in order to arrive at the gross weight lifted: also that none of the hydraulic machines are fitted with devices for varying the expenditure of water. Proceeding at once to the vital question of money expenditure, we find that, in three cases taken, the cost in lift A is 1·79d. per 50 foot-tons, in lift B is 5·95d. per 50 foot-tons, and in C is 3·05d. per 50 foot-tons. It would have been of value had the author of the paper helped us by some explanation of the vast difference between, say, 1¾d. and 6d. spent for the same total work done. In the absence of positive information, we can only conjecture that the more economical lift was working up to or near its full capacity, whilst the wasteful one was very lightly loaded. Thus, if in both cases the lifts were of one ton capacity, and A was taking only one 6 or 7 cwt. bale at each journey, while B was carrying a ton each time, it would approximately account for the difference in economy, for it takes practically as much water to send a hydraulic lift up empty or lightly loaded as when full. That is the chief point to remember in connexion with hydraulic lifts. Of course the discrepancy may have been due to cut leathers, a scored ram, or leaky valves. In that case the waste should be set down to negligence of the user; but when it occurs through light loads it will be inherent in the system, until someone introduces a cheap and practically effective method of apportioning the water used to the useful work done.

Turning to another of Mr. Parry's tables we find the cost given of working warehouse hoists by steam, gas, and compressed air. Here again we have wide variations in charges with the use of the same description of power, any explanation of which we have not been able to find in the paper. A 12 nominal h.p. engine works at the rate of 0·62d. per indicated h.p. per hour. An 8 nominal h.p., at 1d. per i.h.p. per hour. Here is a very wide difference, not to be accounted for by any of the details given. The cost appears to include coal, stores, water, wages, and repairs. It is a great pity, too, that Mr. Parry did not adhere to his original unit of work of 50 foot-tons, instead of complicating the matter by indicated horse-power, in which there are so many uncertain factors, including that totally unknown quantity, the friction of the machine, to be added. The foot-ton is a simple and certain quantity. Two gas-engines are instanced. These cost, respectively, ·33d. and ·52d. per i.h.p. per hour. Two compressed air-lifts cost 1·00d. and 0·40d. per 1 h.p. per hour, respectively. We quote the above figures, because they are the unbiassed results of actual commercial working, and will prove useful if taken as rough guides.

There is in the paper another table, in which further information is given of two other gas-engines working hoists. These engines were started in the morning and kept running all day, whether the lifts were in use or not. They were probably engines of the older pattern. The results of five trials are given, and cost for gas varied between 0·285d. per fifty foot-tons and 1·450d. per fifty foot-tons. The economy varied inversely as the total work done, nearly, and we should judge by the figures that by far the greater part of the excess of 50 per cent. of cost (in the latter case over the former) would be done away with if the gas-engine had been stopped and started as the work was required. It would therefore seem that for intermittent work care should be taken to provide a modern, easily-started gas-engine.

Further results of trials made by Mr. Parry have been published as an appendix to his paper. From this we see that in the case of three steam-hoists the best average result was a cost of 0·0689d. per foot-ton; whilst on a gas-engine the equivalent cost was 0·0542d. Here, however, fuller details are required to make an exact comparison.

Finally, Mr. Parry compares high and low pressure water-service for power purposes. Low-pressure (50 to 80 lbs.) water from the Liverpool public mains is charged at the uniform rate of 7d. per 1,000 gallons, whilst the Hydraulic Power Company charge a varying rate for their high - pressure (700 lbs.) water, according to the quantity used: thus, for 4,000 gallons the rate would be 10s. per 1,000, which equals 2*l.* for the total quantity. Equivalent power from the Corporation's mains would cost 1*l.* 7s. 2d. For a total of 10,000 gallons (7s. per 1,000) used, the total cost would be about equal as between high and low pressure; but above that, the high-pressure water is cheaper. When we come to 300,000 gallons, the rate of high-pressure water is 2s. 10d. per 1,000. For that total (300,000 gallons) the cost would be 42*l.* 10s. for high-pressure water, whilst the Corporation would charge 102*l.* 1s. 8d. for the same power supplied. Mr. Parry's comment on this part of the question may be quoted. "It is obvious that ordinary water-mains laid for domestic and manufacturing services can be utilised only to a very limited extent for power purposes, and that the relatively low pressure they carry cannot be economically applied as a motive power for driving large machinery. With a pressure of 700 lb. per square inch a main 6 in. diameter will carry about 100-h.p. To obtain the same power from a main conveying water at the pressure ordinarily available for town supplies the diameter of the pipe required would be 21 in. Pressure from the mains of corporations and water companies cannot compete with high-pressure water from mains specially laid for hydraulic purposes when the power water is sold at rates not exceeding 5s. per thousand gallons."

THE ORIGINAL DUCAL PALACE AT VENICE.

FROM AN ITALIAN CORRESPONDENT.

THE recent restorations carried on under the guidance of Signor Forcellini, architect, have contributed to spread a considerable amount of new information with reference to the construction and the history of the Ducal Palace in Venice, and have likewise aided Signor Galli in discovering whether, previous to the existence of the present Ducal Palace as it now stands, there was not another in existence, and also what was its form and its site.

The study of Signor Galli is very interesting, and the results which he has obtained are calculated to awaken the curiosity of the archæological and architectural world.

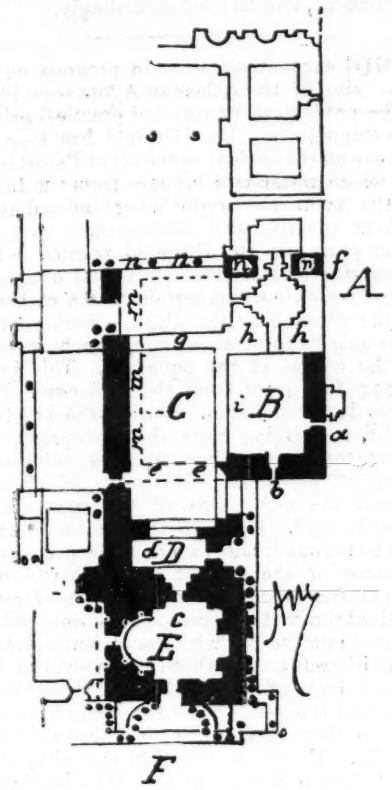
As is well known, the construction of the Ducal Palace at Venice may be regarded as distributed over five epochs: from the time of Angelo Partecipazio (814) to Sebastiano Ziani (1173), from Sebastiano Ziani to Bartolomeo Gradenigo (1340), from Bartolomeo Gradenigo to Francesco Foscari (1425), from Francesco Foscari to Giovanni Morcenigo (1484), and from Giovanni Morcenigo down to our own time.

During the successive Governments of all these doges, therefore, the Ducal Palace continued to undergo a gradual transformation. Hence the question: How much is there left of the Palace such as it was in the first period? Filiosi, Cicognara, Daru, Selvatico, Zanotto, Lorenzi, Fulin, and all who have written on the subject, held that of the Ducal Palace erected by Partecipazio not a single stone was left, nor can anything about it be discovered.

But now recent observations have completely upset this theory. The façade of the basilica is on the west side of the Piazza San Marco, and further back on the Piazzetta are the "Gran Porta della Carta" and the western front of the Palace. In the rear on the south side of the basilica, between this and the Porta della Carta, extending for a few mètres, are two walls forming a right-angle. In the angle, after being converted into a room, was placed some centuries ago the treasury of the church; but there is nothing in the interior to show that that portion of the building was erected to contain it. By careful observation we discover that the wall is thickened in order to make the room square; therefore an old wall existed previously which was not built for the treasury room. Let us bear this in mind. From the exterior we gather other elements which give us ground for belief in the pre-existence of a construction which differed from the present one. The decorated cornices which surround the angle are as ancient as those of the vestibule of the basilica, but their projection shows that they were not placed there before this portion of the building in the eleventh and twelfth centuries (as well as the church) was veneered with marble. Hence the most superficial examination is enough to convince one that this brickwork angle was not originally annexed to the church,—that is to say,

not connected in any organic way with its structure.

We must now trace in the mind's eye the lines of this angle; the walls become delineated, the buildings reassume their shape, and we can imagine that previous to the eleventh century, when the church was in the shape of a basilica, that church was detached from the Palace; detached from the south side, which ran in a straight line; detached from the two chapels (Zen and



References.

Angle of the basilica of St. Mark.
Black shows the buildings of the ninth century.
The others are additions of the tenth, eleventh, and twelfth centuries.
A. The Ducal Palace.
B. The Treasury.
C. The Baptistry,
D. The Putti Chapel.
E. The Zen Chapel.
F. Principal façade of St. Mark.

Putti), which stood on the angle on that side. And is it possible that that angle (*a b*), projecting from the Palace with an immensely thick wall, would have been erected in so much isolation, standing solitary in space, without rhyme or reason? Then, as Signor Galli justly observed, a story told of Candiano IV. flying from the burning Palace, and saved by taking shelter in the court of the church, would be unintelligible; nor would the older chronicles be intelligible, especially the one discovered by Signor Galli as contemporaneous with the foundation of the basilica, which describes it as "Juxta Palatium;" nor other more recent ones,—one, for instance, about Dandolo, in which the basilica is stated to have stood in an angle of the Palace: "in angolo ducalis palatii condita est."

But Professor F. A. Gfrörer, who, referring to the subjection of Venice to the Byzantines, takes as the starting-point of this subjection the translation (or removal) of the body of St. Mark, on the basis of a statement of Deacon Giovanni considers that the first church of the Evangelist was not a separate building but a part of the Palace, namely, a chapel standing in an angle of the ducal palace. In that case it is certain that the Zen Chapel originally had nothing to do with the present basilica of St. Mark; and it is further certain that originally, not only when the church was enlarged in the shape of a Greek cross, but when built in brick, the site of the present baptistry was either left vacant or contained no buildings annexed to the church. The baptistry owes its origin to the Doge Dandolo (fourteenth century), who must have built the wall between the new chapel and the angle which was subsequently used for the treasury. Probably it was he who pulled down the thick wall (*e e*) which started from the ducal palace, and stretched straight in front of the original chapel of St. Mark, as far as the basilica. Let us bear in mind the length of this wall (*e e*); this same length carried to the wall of the basilica in an eastern direction, gives another side (*m m*), which terminates at the pilaster of the inside southern dome, and previous to the eleventh century formed a part of the wall of the brick basilica. This length, if carried parallel to the first side (*n n*) will meet the thick wall which we saw rising from the sanctuary of the relics, and is a sufficient explanation of it. The remaining side is constructed from the wall (*f a*), which even now enclosed the Palace, and turns at that angle from which we took our starting-point. We thus proceed from the fixed and ancient points, and we have a square. This is the discovery of one of the first portions of the Ducal Palace, and of one of its defences.

Signor Galli says that it clearly follows that the northern wall of the Palace (814) ran precisely on the line which bounds it even now, and leads to the large gate called the Porta della Carta, having joined which it extended to the west, forming a tower. When the church was built (829), dangers from without still existed, internal animosities were still kept up; therefore the defences of the communal palace could not have been diminished. If they were anxious to erect the basilica to the patron saint, "juxta Palatium," how could it be placed up against the wall of the latter? Would not the projecting tower have been an obstacle in the front? It would have been necessary to find some other means; it would have been necessary to place the basilica not along the wall of the Palace, but along the wall of tha most prominent part, that is the portion on the northern side of the tower. This explains the line of the whole basilica at a distance from the Palace; here is [where the northern side of the tower stood. The result of the researches in the interior is that the tower must have been rectangular with sides of about 14 mètres and an area of over 200 square mètres. As to the façade of the Palace,—the one on the Piazzetta,—this appears to have been constructed in two different epochs. The portion from the angle on the quay to the eighth column was built between 1340 and 1370. The portion from the eighth column to the great entrance-gate, or, rather, to the supposed tower, was built by decree of 1422, hence we read, "On March 27, 1424, they commenced to pull down the old palace in order to re-erect it," this being under the Government of Francesco Foscari. Almost sixty years therefore passed, from 1370 to 1424, during which the first portion of the new palace, as it is now seen, and the last portion of the old one, had stood together on the western side.

Let us now glance at the Porta della Carta; its history may be suggestive. Sansovino speaks of this celebrated gate as erected by the Buonos in 1438, but previous to that time did there exist a *great* palace gate? And what was its position? In order to discover it, excavations were undertaken. These excavations were carried 2 or 3 mètres along the front of the column which marked the division between the "new" and the "old" palace, and at a depth of 40 centimètres a pavement was discovered. Signor Galli followed its traces, and succeeded in discovering that that pavement led to a wall the height of which was 2 mètres. This is a very important point, and worthy of notice. From the line of the present columns it was 1·70 mètres distant. It was a buttress of oblique wall, consisting of masses of stone taken from the Euganean hills, placed roughly, but regularly, so that it appeared as though intended to serve as a parapet, and to be in sight. It ran towards the north. In front of the fifteenth column (always reckoning from the angle of the quay), the wall turned and crossed the Piazzetta in an oblique line* towards the Piazza; but after a few mètres it continued on the original line, along the pillars of the portico, passing along the front of the Porta della Carta, and ending at the projection of the angle which now forms a portion of the treasury of St. Mark, namely, the southern side of the ancient tower. In front of the Palace then there was a canal (this canal no longer exists) and the entrance-gate which, according to the most careful observations, must in ancient times have occupied the same position as the present Porta della Carta, and have been provided with a drawbridge.

All this renders it obvious that the arrangement of the Palace must have been originally different from what it is now. As a matter of fact, the researches which have been made to discover the truth of such a supposition have shown that the ancient palace did not possess any projecting portico. A large stone wall was discovered on its outer surface, and filled in roughly, the extremity of which was behind the seventh column, where a much wider pilaster than any other is to be found, and where the above-mentioned canal commenced. The limit of the gate and the height of the wall clearly indicate that before the erection of any gallery or portico that line constituted one of the extremities of the Palace.

To resume, the main dates stand thus:—

814. Angelo Partecipazio builds the Palace.

946. Partially burned under Candiano IV., it was not restored until the time of Pietro Orseolo I. This is the original one restored.

1,000. Deacon Giovanni, speaking of Angelo Partecipazio, says "qui palatii manentis fuerat fabricator," therefore Partecipazio's Palace in its general formation was still in existence.

1,105. The Palace partially burned was restored by Ordelaffo Falieri. The restoration refers, therefore, to the ancient remnant.

1,172. Ziani, according to one of the chronicles, renovates and enlarges the Palace, in such a way, adds another chronicle of older date, as to be regarded as the founder; "et fuit tempore sui principatus inchoatum palatium Venetiarum." Therefore, the old palace was preserved down to the time of Ziani, together with the projecting tower, the gate attached to the drawbridge and the surrounding wall, and it was opened to the boats by means of a 7-mètre canal (the measurement has been taken from a series of observations which I cannot offer in a brief survey like the present).

Other researches have brought to light that in the space comprised by the transverse foundations,—or, in other words, from the thick seventh column as far as the quay,—there was no palace existing previous to 1173. The older palace ended here; the great stone wall was one of its extremities, as I have observed, and the tower above-named standing within the angle raised on high its castellated walls. The importance of Professor Galli's studies is confirmed (if it needed confirmation) by a manuscript existing at Oxford, and written by three monks of the fourteenth century (English, perhaps), who went from Venice to the East, and on their return home wrote their account of the journey, "qui parole de la graund Armente de Persie et des Tartares et d'Ynde et de graund merveilles qui p. tout le mond sont." In this account they described the Church of St. Mark, the Ducal Palace and the Piazzetta, nor did they forget to put the date, 1360. This manuscript belongs to an epoch too distant from the original Ducal Palace, but in some points it may be considered as precious since it confirms the studies and researches made on the angle wall containing the Treasury, it shows the existence of the tower and a castellated wall, viz., the same one that enclosed the ancient palace of 814. The general external appearance of the original Ducal Palace was that of a very strong castle; nor need we be astonished at this, as in Venice many of the most important buildings had the same

* Our readers should refer to the plan of the Piazza of St. Mark, but most of them will doubtless remember it.

appearance, from Ca Foscari and Ca d'Oro of the sixteenth century back to Ca Loredan Da Mosto and Pisaro (later on converted into the Fondaco dei Turchi) of the twelfth century. A. M.

NOTES.

IT seems to be a recognised function of the House of Lords to utter from time to time a note of wailing on the subject of London smoke and fog, coupled with the suggestion of heroic remedies the adoption of which is to be pressed upon the legislature as a public duty, without much consideration either of the scientific possibilities of the course recommended, or of the practical working of the legislation to be set in operation. Viscount Midleton's speech on Friday the 12th was in the traditional style of utterances of this kind in the Upper House. A Royal Commission was to be appointed (which after many months would probably tell us only what we know already), and the inhabitants of London were to be subjected to a system of house-to-house visitation on the part of officials who were to see that they burned only one kind of coal and used only an approved pattern of grate. Lord Salisbury's comment on the speech was a model of common sense. After drawing attention once more to the fact (which anti-fog agitators apparently wilfully keep out of sight) that the fogs to which London and its neighbourhood is liable arise in the main from natural causes which we cannot contend with, he proceeded to say that—

"He quite agreed with his noble friend that there were certain remedies which might be adopted if they were willing to carry out a particularly drastic line of legislation. By far the most effective remedy they had heard of was that everybody should be forbidden to use any fuel except anthracite coal. The result, however, of such a prohibition would naturally be to increase enormously the price of that class of coal, and likewise to condemn the population to give up the use of open grates. In his opinion, it was very doubtful whether the people of London would condemn themselves and their children to sit by a flameless fire. Such were the difficulties which attached to remedies of this character. He believed that as far as scientific investigation had gone there was not much to ascertain either as to the nature of the London fog or as to the remedies to be applied to it. The main difficulty was political, because they would be requiring from the owners of the million and a half chimneys in London a sacrifice which they could not expect from the people of a free country. Moreover, such a remedy would require the establishment of a gigantic system of inspection. Was it possible to conceive a state of things in which inspectors should be going into every house in London to see whether the grates were properly made or whether proper fuel were being burnt in them? The burden thus entailed upon the inhabitants of the metropolis would be worse than the results from any London fog."

That is the plain common sense of the matter. People are naturally liable, when under the infliction of a London fog impregnated with smoke, to curse their existence for the moment and to feel that "somebody ought to be hanged for this." But if the whole population of London were condemned to sit by black and cheerless fires, under the penalty of an inspector demanding entrance to their Penates at any moment to report them for a fine, we should soon have a more dire outcry on the other side. One course, however, we will suggest, which it may be possible to carry out, which need not involve discomfort or serious expense, and for which it might be practicable to legislate. This would be, to enforce, within the boundaries of London, the use of gas for cooking. A considerable proportion of what may be called "private smoke" arises from kitchen fires, even in winter, and in summer of course they form the principal source of it. The adoption of gas would relieve us from this proportion of smoke, and though it would entail a certain expense in the installation, it is in the long run cheaper than coal cooking, besides having many other advantages in point of convenience. Lord Salisbury would be willing to assent to the appointment of a Committee of the House to consider the question; and if such a Committee is formed, we commend to their attention the possibility of enforcing cooking by gas, as one practicable method of lessening the amount of London smoke.

SUCH disputes as the London Coal Porters' strike touch the general community more nearly than some labour disputes of far greater magnitude. When supplies of food or fuel are stopped,—as in this case or in that of the great dock strike,—public interest is strongly aroused, and much gratification is felt when the dispute is settled. It is very fortunate that the coal strike terminated so speedily, or the hardships of many in the metropolis would have been considerably aggravated by the return of winter this week, had the strike been prolonged. The work of the railway companies, too, would soon have been seriously hampered by their sidings being blocked with coal. The question at issue seems to have been the now oft-recurring one of whether masters are to have the power to employ free labour or not. No fewer than fifty-nine strikes last year had their origin in the refusal of trades unionists to work with non-unionists, although, of this number, 57·6 per cent. were unsuccessful. The Secretary of the Society of Coal Merchants, in his statement of the causes of the dispute, said that the Committee had always set their faces against any discrimination between unionists and non-unionists; but a clause in a circular issued by him in the name of the Society last week, requesting merchants not to engage anyone unless he could produce a satisfactory reference from his last employer, was regarded by the unionists as a breach of this rule. In fact, peace was only restored on the Society passing a resolution recommending its members to fill up vacancies from the best men who applied, whether they had been on strike or not. A considerable section of the strikers have since been roundly abusing their officers for their efforts in the cause of peace, and for some time they refused to return to work. Of course, the resolution just quoted did not bind the masters to immediately re-instate every man who had left his employment, but this is what the malcontents among the unionists seem to have expected their President to have demanded. The order of the Council for a general resumption of work is being obeyed with such very bad grace that it may be that we are not yet out of the wood in this matter.

THE National Association for the Promotion of Technical and Secondary Education has issued an address to the electors for the new County Council for London. This address points out that the only two counties which are doing nothing for technical education are Middlesex and London, and that the amount of money available for this purpose in London is 163,000*l.* a year. The appeal is well timed, and it is very desirable that candidates should declare their views on this question. It may be doubted whether the money is quite wisely spent by some County Councils: there is a good deal of groping in the dark. But in London the need for technical education is so clear, and it could so easily be carried out, that there can be no doubt that the new Council should at once take up this subject. This object will be much surer of attainment if electors will consider the matter and obtain pledges from candidates. No new rates are required,—the money is ready, and its use for the purpose for which it was intended will conduce to the welfare of London and of its trade. Lord Lingen has, in a letter to the *Times*, endeavoured to excuse the London County Council on the plea that the use of this money for the purposes of technical education was permissive only, and that it was reasonable to throw it into the general funds of the Council. There is no doubt, however, that the Government did intend that this sum should be used for technical education, though they wisely left the matter very much at large, so as in no way to fetter the action of local authorities. Lord Cranbrook's answer in the House of Lords on Monday last to Lord Cowper's inquiry as to the permanence of this grant indicates plainly that the Government will still continue to make this grant for the purposes of technical education. Under these circumstances it is clear that not only should London follow the example of other local bodies in regard to technical education, but that in those parts of the country where the grant is considered as temporary only, it should be looked on as permanent, and be used accordingly.

THE excavations now in progress on the site of the Athenian Agora seem likely to be productive of unusual practical gain to the community. Dr. Dörpfeld has long had his eye on the ancient aqueduct of Peisistratos, by which water was brought from the Ilissus to the Agora, the supply being rendered available at the so-called Enneakrunos fountain. Four years ago Dr. Dörpfeld pointed out to us *in situ* what,—from somewhat complex *a priori* reasoning, and certain marks of boring in the rocks near the Pnyx,—marks noticeable only to the trained eye,—he believed to be the course of the aqueduct. This belief is now (we learn from the *Athenæum*, February 13), conviction. During the last fortnight, in digging near the Areopagos, the excavators have come upon a substantial bank of polygonal stonework, which supported the north side of the great Panathenaic road. Close to this wall a reservoir has been found, and two or three paces away remains of the ancient aqueduct are to be seen. The modern Athenian has already utilised the water-course of Hadrian, and he hopes to do the like with the ancient aqueduct of Peisistratos. Be that as it may, the discovery both of the lie of the Panathenaic road and the position of the Enneakrunos is of the first importance to Athenian topography. Everyone who has mentally, or in print, drawn a plan of the Athenian Agora will have to look to his imaginings by the cold light of fact, and it is not too much to hope that this same cold light may lay for ever the ghost of the "Enneakrunos Episode," which has so long troubled the dreams of archæologists.

NOT less interesting is the news that Dr Waldstein has obtained for the American School of Classical Studies at Athens permission from the Greek Government to excavate during a term of seven years the site of Sparta, with Amyclæ and other adjacent Laconian places. If America has lost Delphi, Sparta is a good second in interest. We owe to the neighbourhood of Sparta the unique collection of archaic grave-reliefs, now for the most part housed in the local museum there. Vaphio, near Amyclæ, has yielded the gold cups which have taught us so much that was unexpected as to pre-Dorian art. Popular expectation will look to Sparta for statues of Helen and Menelaus, Leda and the Dioscuri; science will look for the ground-plans of some of the countless buildings, civic and religious, mentioned by Pausanias; also for inscriptions, for votive offerings that will throw some light on ancient pre-historic cults that may tell us of Amyclæ before the Dorians destroyed it, of Hyakinthos who came before Apollo, of Alexandra before she became Cassandra. English and Germans, as well as Americans, will congratulate Dr. Waldstein on his good fortune, and will eagerly look to see where he first puts in his spade.

TUESDAY next is the one-hundredth anniversary of the death, at 47, Leicester-square, of Sir Joshua Reynolds. Most of the houses he occupied in London can yet be traced. After his father's death, in 1746, he settled in London. Returning from Italy at the end of 1752 (see Northcote's "Life" *),

* Mrs. Thrale records that Johnson's essay upon Procrastination, in "The Rambler," was hurriedly written in Sir Joshua's parlour. The essay appeared on Saturday, June 29, 1751.

he, by advice of his early friend and patron, the first Lord Edgecumbe, came to town, and lived in a house by St. Peter's-court, on the western side of St. Martin's-lane, over against May's-buildings. Thence he removed to No. 5, Great Newport-street, northern side, originally the central portion of a house since sub-divided into Nos. 4, 5, and 6. The then garden has been covered by a picture-gallery. Here Reynolds raised his charges to twenty-five, fifty, and one hundred guineas for a head, a half-length, and a whole-length respectively. In 1761 he bought a house in Leicester-square, now occupied by Messrs. Puttick & Simpson, the auctioneers. On July 20, 1762, Dr. Johnson writes to Baretti at Milan: "Mr. Reynolds gets six thousands a year. . . ." Six years later he is knighted, and elected first President of the Royal Academy. The large sale-room at the back of No. 47, Leicester-square, is commonly taken for his painting-room there. But we are authoritatively informed that that apartment was built about fifty years ago, for purposes of the Western Literary and Scientific Institution. Reynolds's studio was a back room, beyond the present lobby, octagonal in shape, and about 15 ft. high. The railings of the main staircase are, we understand, of the painter's time; they are curved out at the foot, to afford more space for the ladies' hooped dresses. This house was afterwards inhabited by the fifth Earl of Inchiquin and first Marquess of Thomond, who, in 1762, had married, for his second wife, Mary, daughter of John Palmer, of Torrington, a niece of Sir Joshua. Reynolds first met Dr. Johnson at the house, in what was then Castle-street, Oxford Market, of the Misses Cotterell, and attracted the attention of Johnson (who lived in Castle-street) by replying to the ladies that the death of a friend to whom they owed obligations had, at any rate, relieved them of a burden of gratitude.

THE proposed Berlin Cathedral is again being talked about in the German capital, the interest in the subject having been revived by the Emperor, who has expressed a wish to inaugurate the "Dom" on his first birthday in the new century. Professor J. Raschdorff has, apparently, during the months he has been in oblivion, had some steady work done in the reduction of his last design to a less extensive and cheaper one, and we hear that a very complete set of drawings of this "reduced" scheme will be put before the Prussian Houses of Parliament, when the vote for the first 15,000*l.*, of an estimated total of 500,000*l.* will be asked for by the Government. Of the 30,000*l.* voted some years back for the preliminary office work, some 20,000*l.* yet remains unspent, but this sum is to be applied for the erection of a provisionary wooden or iron church, for the use of the Court whilst the cathedral is in course of erection on the site of the present church. The 15,000*l.* referred to above is intended for the preliminary foundation work which the Emperor and his architect would like to see commenced this summer. We, however, scarcely believe that the money will have more chance of being granted this session than in the one of last year in which it was refused. The old objections relating to site, architect, plan, and architecture, are making Raschdorff's Cathedral scheme more unpopular every year, and the provincial representatives in the House are not much in favour of their constituents having to pay for what they regard as an unnecessary luxury in the capital. If the Landtag will not vote the money, and the Emperor wishes to stick to site and architect, he can however still have recourse to his privy purse, or to his power of granting a public lottery.

THE Sandwich Corporation have invited tenders for the construction of an iron swing-bridge,—in place of the present wooden one,—across the river Wansum or Stour. The existing bridge, being opposite to the Davis, or David's, Gate, stands midway between the ancient ferryway at Key or Fisher Gate (east), and the site of St. Mary Gate (west). The first bridge at this spot was build in pursuance of an Act passed in 1754, and consisted of two arches with a lift-bridge between them. An illustration of it will be found in W. Boy's "History of Sandwich" (1792). In Hasted's "Kent" (1799) the bridge is described as having been "lately rebuilt with great improvements." On crossing the bridge one is in Stonar, the supposed Lapis Tituli of the Roman occupation in Thanet, and sees stretching before him into the distance northwards the straight level road to Ebbesflete, and so on to Ramsgate. The Canterbury Gate in the walls of Sandwich was pulled down in 1784, and three others shortly afterwards, so that there now remain only the Fisher Gate and the David's Gate with its two conically-roofed turrets,—the one the Barbican, the other the Custom House, a favourite "bit" of old Sandwich.

ON March 21 last we adverted, in a "Note," to the impending demolition of the Skinners' Company's Almshouses (as rebuilt in 1729), founded by Sir Andrew Judd, Knight, in Great St. Helen's. In that same place a fine specimen of our old merchants' houses will soon, in all likelihood, be destroyed; for its site is about to be put up at auction on a building-lease for a term of eighty years, and the materials are included in the letting. The house, marked by its handsome elevation, of red brick, is numbered 8 and 9, in Great St. Helen's, and is that which Sir John Lawrence built in 1646, employing, it is said, Inigo Jones as his architect. The pilasters have stone capitals, the second floor window-sills project boldly beyond the deep voussoirs beneath; on the front are

L
A I 1646.

In No. 9, are a good mantelpiece, and a handsome Jacobean staircase. Lawrence was elected Lord Mayor in 1664. He erected a white marble altar tomb to his wife Abigail (1682) in St. Helen's Church; where Judd was buried (1558); and there, against a pillar in the chancel, was set up, over his seat, a carving of his coat-arms. The Crace collection contains a copy of Prattent's small print, 1796, and a drawing, 1856, by T. Hosmer Shepherd, of this house. An adjoining house, No. 10, was, reputedly, a home of Anne Boleyn's father, and is believed to have been one of the oldest private residences of its kind in London. We also find that the lease, for about fifty-two years unexpired, of No. 18, St. James's-square, corner of King-street, was announced for sale by auction at the Mart on Thursday last. Here Lord Castlereagh resided for a while, and on more occasions than one was made to feel his unpopularity with the mob. Converted into residential chambers, at rents amounting to 1,270*l.* per annum, it is now held at a ground-rent of 100*l.* a year.

WE are very glad to see that (as we report in another column) the London County Council propose to acquire power for the decent preservation and protection of York Water Gate, at the bottom of Buckingham-street, Strand, on the edge of the Embankment garden. The neglected condition of this monument has long been a reproach to those who own it or claim to be its owners. There is, it is stated, no "beneficial ownership" in the gate, and this, perhaps, accounts not only for the neglect which it has suffered, but for the fact that it has come down to the present day at all. If the Council acquire the powers they seek, as we hope they will, we trust that their professional advisers will be conservative in their treatment of the monument. From the fact that it is at present partly situated in a hollow, owing to the formation of the Embankment and its garden, it has been proposed to lift the whole thing bodily, but objections more or less weighty have been urged against this course being taken. Without altering the level of the gateway, it might perhaps be utilised as an entrance to the garden from Buckingham-street. The gateway is generally (and we believe rightly) attributed to Inigo Jones, although it has been ascribed to Nicholas Stone, who was probably only the executive master mason. On this point we may refer our readers to an article in the *Builder* for June 21, 1879, p. 677.

IN his last four weeks' report on the sanitary condition of Kensington, Dr. Orme Dudfield, the Medical Officer of Health for that district, makes some strong remarks, in the spirit of which we entirely concur, in regard to the power still left to the Water Companies, though under certain salutary restrictions, of cutting off the water supply from premises in default of payment of water-rent. Commenting on the clause in section 48 of the new Act, which rules that "an occupied house without a proper and sufficient supply of water shall be a nuisance liable to be dealt with summarily under this Act," Dr. Dudfield observes that,—

> "It does seem absurd in these days of sanitary progress, that the Companies should have the power to cut off the supply, and so create a nuisance 'liable to be dealt with summarily under this Act.' The position of the Sanitary Authority, moreover, it being their duty to take proceedings for the abatement of the nuisance thus created,—a duty which in effect makes them the agents of the Company to secure payment of the rate,—is undignified, not to say ridiculous. Surely it is time that steps were taken to correct such an anomalous state of affairs, affecting, as it does, a question of prime importance from the public health point of view."

THE water-supply of Chicago was cut off on two occasions last January, by what is known in America as "anchor ice," which appears to be similar to the "ground ice" of this country. The ice lodged round the intakes in the lake, and in one case the flow of water was stopped until a fire float had cleared the gates by means of sinking hose to the spot and pumping through it. At another intake an arrangement had been specially provided for the purpose. This consisted of a perforated pipe, which surrounded the intake, and by means of which compressed air was forced into the water to prevent ice accumulating. This apparatus is said to have been ineffective, but it is questionable whether the obstruction was not caused by ice piling up round the gates, the water having been very low at the time. In that case the compressed air would naturally have been insufficient.

WE hear that Sir John Cocde, the eminent engineer and past President of the Institution of Civil Engineers, has been elected a member of the Athenæum Club under the special rule which empowers the Committee to elect from time to time such eminent persons as they may select for that honour.

THE *Transactions* of the Edinburgh Architectural Association, Part IV. of the first volume, contains a great deal of information about Scotch castles and mansions visited by the Association at different times during the past three or four years, a paper on each being read by the member who conducted the visit. The buildings treated of include the Parliament House and Argyle Tower, Edinburgh Castle; Kinross House, Tullibole House, Drum House, Dirleton Castle, Linlithgow Palace, Norham Castle, Bonhard House, and others.

A NEW monthly review, under the title *Natural Science*, and devoted more especially to biology and geology, is to be issued by Messrs. Macmillan next month.

THERE is to be an International Exhibition this year in the Isle of Man, of all places. The site is at Belle Vue, near Douglas, and the Exhibition is to include industrial and fine art exhibits, with a special division for "women's industries."

A CORRESPONDENT writes to us complaining very strongly of the absence of attendants at the stalls of the Crystal Palace Electrical Exhibition from whom any information can be got, and the difficulty of persuading the few who are there to give any information as to the exhibits of their firms. The managers of the Exhibition of course cannot exercise any control over exhibitors in this respect. We can only appeal to the exhibitors themselves, in their own interests, to assist the visitors as far as possible by giving information as to the machines they exhibit.

WE wish to call the attention of patentees and inventors who may send us descriptions and illustrations of their inventions for criticism, to the importance of sending technical diagrams (if only sketches) showing the method of working and of construction, especially in the case of patents involving mechanical action. Descriptions of such things are frequently sent to us accompanied merely by pictorial representations, which may do very well to catch the public eye in an advertisement, but which are totally useless in the way of conveying any real information upon which an opinion as to the value of the invention can be formed.

SARACENIC ARCHITECTURE.*

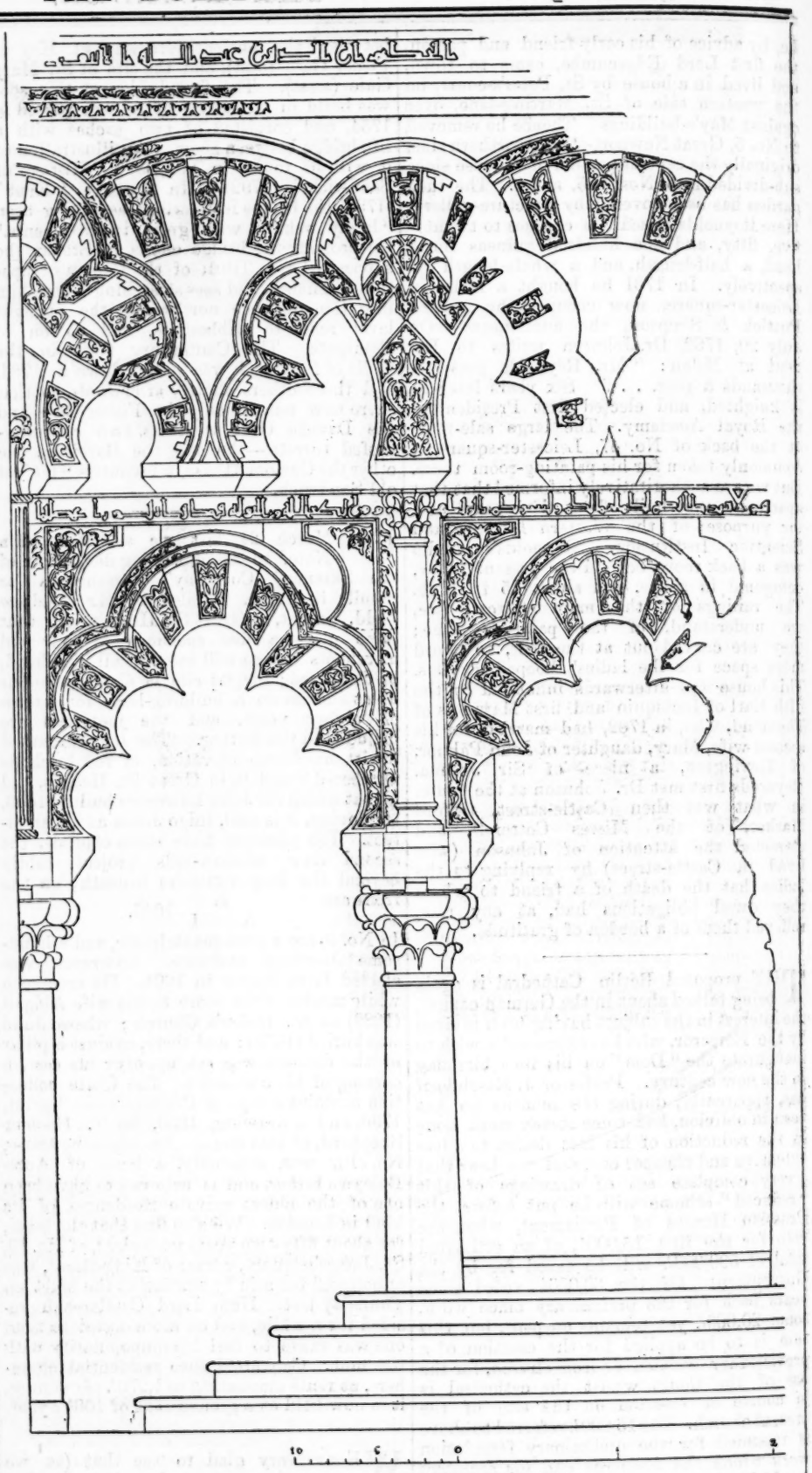
BY PROFESSOR AITCHISON, A.R.A.

THE Saracen architecture of Spain has a double, if not a triple, claim on our attention; it includes the finest early mosque in Europe, whose interior is at once the most striking and unique of modern buildings. This mosque, too, affords us some hints of how, and from what, some of the peculiarities of Saracen art were developed, while the Alhambra shows one branch of Saracen art carried to its ultimate conclusion. We may be proud of that splendid monograph that saw the light through the patriotism of our countryman, Owen Jones, in spite of the discouragement of Government,—I mean "the Alhambra," by him and Jules Goury, though we must not forget the gratitude we owe to Murphy for his work on the Arabian antiquities of Spain.

It is necessary, I think, to say a few words on such parts of Spanish and Saracen history as may enable you to comprehend some of the causes that produced these results, one of which was the falling of Spain under the sway of such patrons of the fine arts as the Omiades.

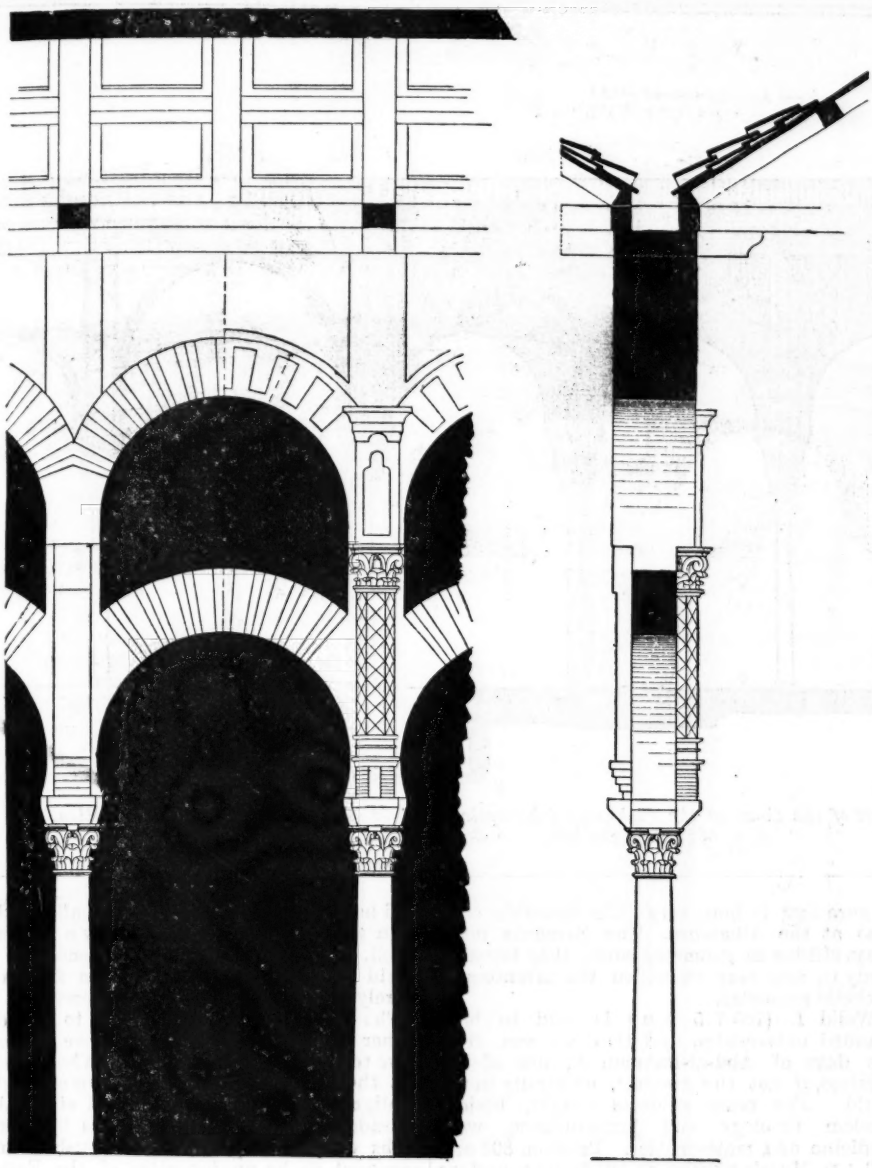
Those portions of Spain that were held by Carthage fell into the hands of the Romans during and shortly after the third Punic war, and all Spain and Portugal fell into their hands about the time of Augustus, and became a portion of the Roman Empire. Roman towns, with their temples, were built, as well as magnificent villas. Corduba on the Baetis, now Cordova on the Guadalquiver, was called the "Patrician colony," as it was peopled by decayed Roman patricians.

On the conversion of the Roman Empire to Christianity, cathedrals, churches, and monasteries were built there as elsewhere. Spain was afterwards overrun by the Huns, the Swedes, the Vandals, and the Visigoths, the Vandals having left their name in Andalusia. These savages were also converted to Christianity, so there were Roman, Byzantine, and Romanesque buildings, and not to speak of the use made of the columns of these buildings by the Saracens, their ornament and some of their architectural features had great influence on Saracenic buildings. Musa-Ibn-Nuseyr, who is said to have been a descendant of a Christian student of a Nestorian seminary on the Euphrates, and who is well known to us as the principal actor in the story of the "City of Brass," had conquered Barbary, and was invited into Spain in Welid I.'s reign; he deputed his freedman Taric with a handful of troops to reconnoitre it. Taric landed in July, 710 A.D., at Calpe, now called Gibraltar, from Taric (Jebel-Taric, the hill of Taric), and successfully plundered the neighbourhood. Reinforcements were sent him, and he defeated the Gothic army on the River Guadalete. Malaga and Granada were taken, Cordova besieged, and Taric proceeded to Toledo, then the capital of Spain, which was deserted by all but the Jews, who fraternised with the invaders. In some of the expeditions to the hills the "Table of Solomon" was taken, set with pearls, rubies, and all sorts of jewels, and with 360 feet. Musa landed in 712 A.D., and, with Taric, proceeded to conquer the remainder of the country; and practically all Spain and Portugal were conquered, except the Crags of the Asturias. Subsequently the Saracens passed the Pyrenees, and took the south part of France, until an Abd-al-Rahman was conquered by Charles Martell (732 A.D.) at the battle of Tours; and subsequently Charles Martell wrested Avignon from the Saracens, and they were driven back to Narbonne. This took place about 737 A.D., in the reign of the Kaliph Hisham I.; subsequently Spain almost fell into anarchy. The Berbers, who came over in large numbers with the Saracens, were looked down on, and so were the new converts, and the old tribal feuds broke out again. Tyranny was producing its baneful effects throughout the Moslem dominions. An indulgence in luxury, indolence, and dissipation were unfitting the leading families for rule; while able Generals and Governors were murdered, imprisoned, or grossly insulted and degraded by the Kaliphs. The consequences were soon felt; able men were driven into opposition,—a new claimant for the Kaliphate was found in Abul Abbas, "the bloodthirsty," a descendant of the Prophet's uncle, El Abbas, who after the defeat and death of Merwan II. (750 A.D.) became the first Abbasside Kaliph. It was difficult to destroy the main descendants of the Omiades, so an amnesty was proclaimed, and about ninety of them were invited to a banquet and there butchered. The uncle of the Kaliph, the originator of this piece of treachery, with his followers, had a carpet spread over the slaughtered victims, and finished their banquet. This reminds one of Cæsar Borgia's banquet at



Cordova Cathedral: Capilla de Villa Viciosa.

* Being the fourth Royal Academy Lecture on Architecture this session. Delivered on Thursday evening, February 4.



LONGITUDINAL SECTION. CROSS SECTION

Mosque at Cordova.

Sinigalia, only he did not use his slaughtered victims as a table for his own banquet. Afterwards those that had escaped were hunted down.

The Omiade Abd-al-Rahman, an ambitious youth, and a grandson of the Kaliph Hisham, made his escape by swimming the Euphrates, and got safely into Africa, where he passed some five years, always intriguing for sway when he had a chance, but without success; he was eventually invited to Spain by the followers of the Omiades there, and landed in 755 A.D., and after two successful battles he became the first Kaliph of Spain. His bitterest enemy, the Kaliph Mansur pronounced the highest eulogy on him. On Mansur asking his courtiers, "Who was the greatest man of Islâm?" they naturally said "he was," but he replied "No, Abd-al-Rahman is. He was a penniless refugee, without friends or an army, and he is now the ruler of Spain, with the largest revenue of any potentate in the world."

I make a few extracts from an article on the mosque at Cordova by Professor Middleton, in which he gives from Arab sources the eloquent speech Abd-al-Rahman made to his Court, when he was about commencing the splendid mosque at Cordova (786 A.D.). This was to surpass anything before built, and was to be the rival of the Kaaba, and thus save the pilgrims of Spain and Barbary from the tedious and dangerous journey to Mecca. Abd-al-Rahman, after extolling the charms and advantages of Islâm over the wretchedness and corruption of Christianity, spoke thus of his proposed mosque:—"We will raise at Ala a shrine only equalled by the holy building at Jerusalem. . . . Let us raise the Kaaba of the West on the very site of a Christian church, which we must needs destroy in order that the Cross may fall amid ruins, and El-Islâm may rise up all radiant. Let its plan be like that of the Basilicas of the Crucified, that the house of God may crush the house of idols. Let it have an atrium, a portico, aisles, and sanctuary, all within an enclosure of four angles, and four sides, like the Holy House of Mecca." The Arab historians say that Abd-al-Rahman took the most enthusiastic interest in his new mosque, visited the works every day, and drew out a great part of the ornamentation with his own hands, and undoubtedly supplied the ancient columns and marbles.

The building of the mosque was carried on by his son Hisham, who devoted his fifth of the plunder of Narbonne and Carcassonne to the work; it was completed in 796 A.D., Hisham dying in the June of that year, so it is not certain that it was opened by him or by his son Al-Hakem I. It is said to have cost a million and a half sterling of our money. In it was the Korân, written by the Kaliph Othman, who was reading it when he was assassinated, so that it got stained with his blood; this was torn up by the Christian soldiers, when Cordova was given up to Alfonso in 1146 A.D. This mosque, called Aljama de Medina Andalus, was subsequently enlarged southwards by El-Hakem II. (961-76 A.D.), who built the Mehrab and the Maksurah, the enclosed sanctuary. The mosque was finished, with its nineteen aisles, thirty-six bays deep, by Mohammed-al-Mansur, the Vizier of Hisham II., though practically the Kaliph, and called Mohammed I., between 976 and 1001 A.D. Supposing Abd-al-Rahman I. was a draughtsman and designer, and did design some of the ornament of his original mosque, I doubt if any of it remains; all the capitals appear to be Roman, Byzantine, or Romanesque; all the ornamentation of the enclosure to the sanctuary and the Mehrab are strongly Byzantine in character, though slightly marked by some foreign influence; and there is a tradition that the Mehrab and its mosaics were done by Byzantine workmen sent from Constantinople. The peculiar cusped arches of the sanctuary, and the Emir's pews (La Villa Viciosa), one tier riding on those below, are possibly original.

San Cristo de la Luz, at Toledo, originally a mosque, has much the same character, with peculiar ribbed domical vaults, like that of the Mehrab at Cordova. The ribs of this last form in plan a Solomon's Seal. The south part of the mosque, with the Mehrab, Maksurah, and the back chambers, are supposed to have been built between 961-76 A.D., nearly a century after Tûlûn's mosque at Cairo (878 A.D.). These cusped arches of the Maksurah and the Villa Viciosa, however, had an important effect on the subsequent Moslem architecture of Spain, for to the last cusping was a favourite device. The ceilings of the mosque were originally of wood, arched, panelled, and enriched with inlay and gilding.

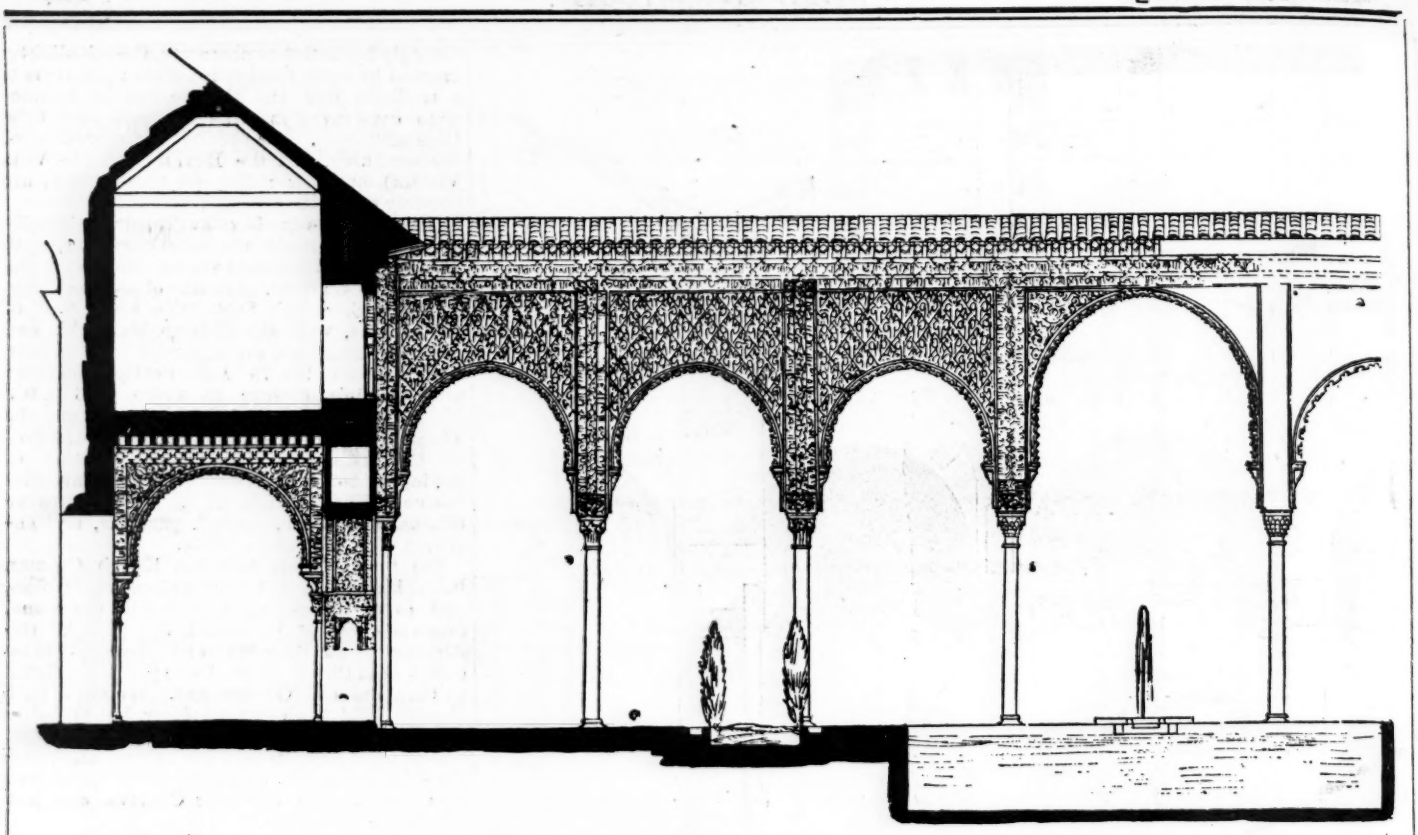
We heard before how the Kaliph Othman built himself a splendid palace at Medina, and every succeeding Kaliph did the same. Moawia's was at Damascus, and that of the Abbassides at Baghdad, and there is little doubt that the Viceroys had splendid palaces at their seats of Government. We know that Mamun held his court at Merv, but probably there is nothing left of any of these palaces. The Spanish Kaliphs were not behind-hand, and the description left us would make us believe that the Spanish one near Cordova was not inferior to the others.

A palace usually included a fortress, round which a town was sure to spring up. This one, called Medinet Azahra, was on the banks of the Guadalquiver, five or six miles below Cordova, was finished in 936 A.D., for Abd-al-Rahman III., and is said to have contained, besides the barracks and a mosque, a mint; coins with this mint mark upon them alone attest its reality. The palace is said to have been 4,000 ft. in length, by 2,000 ft. in width, and naturally consisted mainly of gardens; but 4,300 columns of precious marbles are said to have supported the roofs of its halls; 1,013 came from Africa, 19 from Rome, and 140 were presented by the Byzantine Emperor. The halls were lined and paved with marbles; the roofs were of cedar, ornamented with interlaced work and gilding, but without a trace or an illustration to judge by,—it is mere talk.

The Omiad Kaliphate of the West ended with Hisham III. (1031 A.D.). After that their kingdom was split into pieces, and ruled by independent rulers, was then successively overrun by the Almoravides and Almohades, religious sects almost wholly composed of Berber tribes. Their dominion was, however, brief, from 1073 to 1228 A.D., when Mohammed-ibn-Yusuf-ibn-Hud, descended from the Kings of Saragossa, overcame the Almohades, and ruled for a time over the best part of Murcia, Andalusia, and a bit of Alicante, but the Spaniards were fast narrowing the dominions under Moslem sway.

The first Royal Palace of the Alhambra is supposed to have been built between 1232 and 1272 A.D., by Mohammed Ibn-Yusuf called Ibn-al-Ahmar, who reigned as Mohammed I. of Granada; he was a descendant of Sa'd-Ibn-Obâda, one of the companions of the Prophet; he began to reign after the power of the Almohades was broken, and the greater part of Spain had been wrested from the Moslems by the Spaniards, and was a vassal of Ferdinand III. of Castile. His son, Abdallah, Mohammed II., added to the palace built by his father, and is said to have lavished treasures on the artists who decorated its gilded saloons; he died in 1302 A.D., and successive sovereigns enlarged and decorated the palace. I think that it is only necessary to add that Granada was ceded to Ferdinand and Isabella in 1492. If we could learn the studies pursued by the Saracen or Moorish architects, masons, plasterers, and decorators of that day, it would be useful and interesting, but as we cannot we must try and pick up what we can from the buildings themselves.

The hill on which stands the fortress of the Alhambra is now reached by steep but excellent roads, deliciously shaded by overhanging trees, whose foliage is sometimes so dense that the sun does not pierce it, and sometimes sufficiently open to make a spangled pattern on the road, with channels of clear running water on either side. If its fortress be



The Alhambra: Transverse Section of part of the Court of the Fish-pond (the section to right of the large basin is a repetition of that on the left.

entered by the Gate of Justice, you come on to the unfinished Renaissance palace of Charles the V., with its circular open court or bull-ring, the north side of which touches the Saracen palace. The palace of the Alhambra has the appearance of having been added to at various times; the centre is about 168 ft. north and south, and 107 ft. wide; it mainly consists of a large open court, with a piece of water in the middle, called the Court of the Fish-pond, with cloisters at each end; beyond the north cloister is the Hall of the Bark, a narrow hall like the narthex of a Christian church; this Court of the Fish-pond has no cloisters on its sides, but only suites of narrow chambers; at the back of the Hall of the Bark is a large building, nearly square, 59 ft. long, north and south, 55 ft. wide, forming internally a single chamber, about 36 ft. square, called the Hall of the Ambassadors. To the left of the Court of the Fish-pond is a building about 62 ft. wide, east and west, and 130 ft. long, containing the mosque and its court, and chambers, probably for the Mollahs; there is a niche near the mosque, not shown on the plan; the mosque itself probably had one, but it may possibly have been obliterated by the Christian sovereigns. To the right of the Hall of the Fish-pond, northwards, are the baths and a pavilion for music; and on the same side, southwards, is the Court of the Lions, so called from a fountain supported on the backs of marble lions; this court at the Crystal Palace is about half the size of the original; the court, with its dependencies, is about 103 ft. from north to south, 165 ft. from east to west; to the north of the centre is a projecting building about 63 ft. by 40 ft., containing the Hall of the Two Sisters; opposite in the part already mentioned is the Hall of the Abenserrages.

Ayesha and Zoraya, two of the wives of Muley Ali Abul Hasan, the King or Sultan of Granada, who reigned between 1470 and 1483, quarrelled, and had their partisans; the tribe of the Beni Serraj (the Abenserrages) supported Zoraya, and their head men were said to have been butchered in this hall. The total area of the part of the palace now existing, exclusive of the parts restored or rebuilt by the Catholic kings, contains but 52,625 superficial feet, including the open courts.

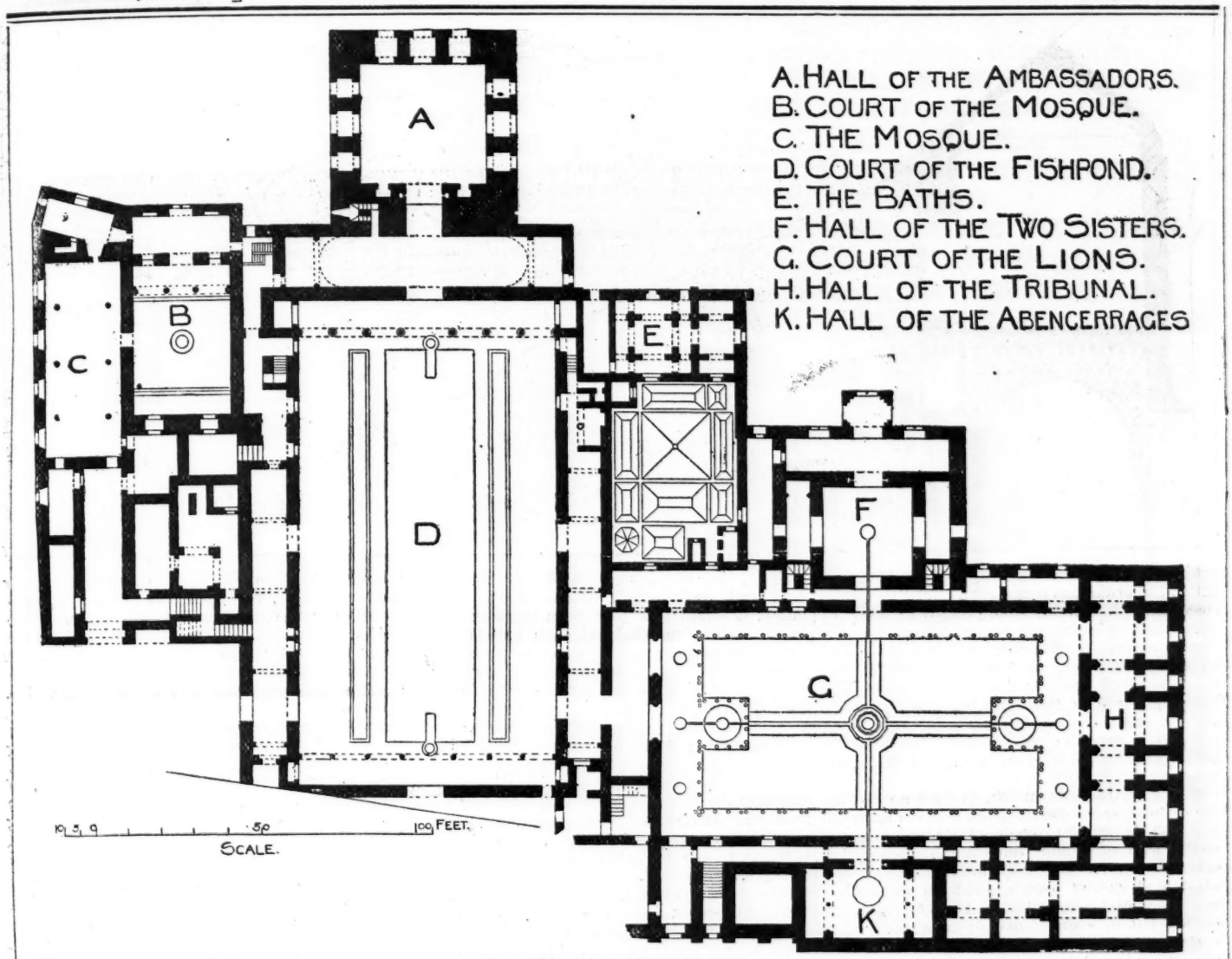
We must bear in mind that all the decoration of this palace is in plaster, once painted and gilt, except the enamelled tiles of the dados and floors. It would be very interesting to know what the costly stucco of Othman's Palace at Medina was like, and it is not impossible that, if the Arabs were to allow excavations to be made at Medina, some fragments of it might be found; however, we may be sure that it bore very little resemblance to that at the Alhambra. The Saracens made great strides in geometry when they began to study it, and may be called the inventors of æsthetic geometry.

Welid I. (705-715 A.D.) is said to have founded universities, and Cordova was, from the days of Abd-al-Rahman I., one of the greatest, if not the greatest, university in the world. The main subjects taught, besides Moslem theology and jurisprudence, were medicine and mathematics. Between 808 and 813 A.D. Musa's treatise on quadratic equations was published, and, we may be sure, gave a great impetus to the study of mathematics. Architects are mentioned in the "Arabian Nights," but they are mostly called mathematicians and geometers.

To speak of the architecture of the Alhambra first, although most of us know very little of the requirements of an Oriental palace, we can form some judgment of the skill exhibited in the planning, for when the arrangement is characterised by simplicity, it is the marked attribute of a good plan. The Court of the Fish-pond is adapted to be lined by troops, so as to impress ambassadors, and the narrow vestibule to be passed through would enhance the effect of the hall; while the Court of the Lions, at the end of which the Sultan sat to administer justice, is surrounded by cloisters to afford shelter to the suitors. The narrow passages in front of the other two halls were convenient for their service. There were many reasons for the exteriors of buildings being plain and almost repellant; among so turbulent a people every large building might be wanted as a place of safety in a riot,—it might even have to be used as a temporary fortress; while in the case of the Sultan's palace, the chances of its being wanted for such purposes were at least doubled. But besides this there was a desire not to provoke envy; the effects of the evil eye were greatly dreaded by every Moslem, so we can only expect to get architectural fronts in courtyards, and these are generally well, and sometimes elegantly, proportioned. The front of the cloister at the north end of the Court of the Fishpond is particularly graceful. There are the six slender white marble columns, and the two half ones carrying elegant arches only just pointed enough to prevent their looking flattened, delicately cusped and gracefully corbelled out beyond the piers on the capitals, and with a most gracefully-proportioned archevolt with vertical panels from the columns, held together by a horizontal band below the frieze; the spandrels and upper part above the arches are diapered; while the centre arch is wider and stilted, runs right up to the horizontal band, and has floral spandrels of much smaller pattern than the diapers, but overlaid by a very large scroll. There is very little architecture in the world that would take the palm from this, merely looked on as a piece of proportion.

The proportions of halls are to our eyes rather excessive in height; but we not only have to consider the need of air in a hot climate, but the passion the natives had for a "mighty contiguity of shade." In the Hall of the Ambassadors, however, the width is but three-fifths of the height. The horseshoe arch, supposed to be an invention of the Eastern Christians, but said to be found in the Pantheon at Rome, is mostly abandoned, or is so slight as to be imperceptible except in the case of the niche, where it is possibly kept from religious conservation or from a cherished recollection of the great one at Cordova, then in the hands of the Christians. The capitals of the columns are original and graceful inventions,—not equal, I admit, to good floral capitals of the Greek, Roman, or Renaissance artists, but superior to most, if not to all, Gothic ones. The capitals are mostly cushion-shaped, but the stalactite ones are an original creation of the Saracens, which are not so interesting, but have a better outline. I must confess that the stalactite arches and domes with their vague outlines do not excite my admiration, and though I am astonished at the domes, I hate their maddening complexity, and their trick of looking without support. Gothic stone pendents are certainly not more agreeable to look at, but they have the merit of being really constructive. Doubtless, the vagueness of outline in the stalactite arches and domes, and their complexity and mystery, had a charm for the Oriental mind. The Western Mediævals were certainly saturated with Saracen thought, work, methods, and manufactures, and they loved complexity, and had learned, most probably from the Saracens, that marvellous effects could be got by the ordered repetition of simple parts. The Saracens were never masters of profiling, and the Spanish ones never admired a firm outline. We see as early as the great mosque at Cordova how fond they were of ugly cusped arches,—cusped, too, on the intrados and extrados, and intersecting one another. At the Alhambra, this passion is carried to excess. The outlines, it is true, are not so ugly as those at Cordova, but they lack the barbaric vigour, and sometimes are almost as imbecile as the ornamented mouldings that are put in modern pianos.

It is impossible to speak of Saracen decoration without considering its colour, for it was made for the colour, and without it is but poor stuff. I will first speak of the tile dadoes:



Plan of the Alhambra, Granada.

these are mostly bad; they have all the faults of oddness or complexity of pattern, without being redeemed by the colour, though there are a few almost wholly made up of blues, greens, and white, with a touch of yellow, which fall just short of being delightful; and there are a few pieces of tolerably agreeable colour, with quaint patterns that are certainly striking. One of these patterns is made up of a sort of rough sketch of a swallow flying, seen from underneath, and this unit is used in pairs, kissing; one pair is green and one black, or dark blue, on a white ground; one pair has the lines of the wings horizontal and the other has them vertical. Admirable borders are made of black bearded battlements on a white ground, and there are some very pretty ones made of texts from the Koran, cut in black tile and inlaid on a white ground.

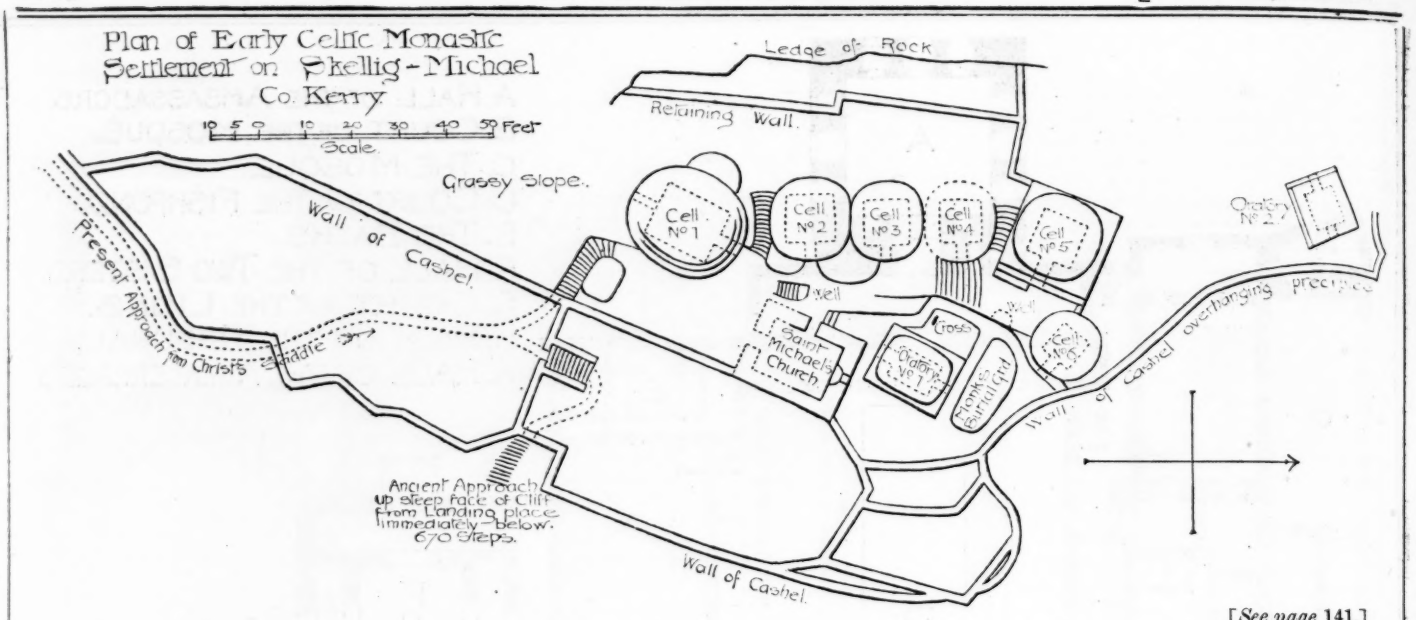
The ornamental plaster-work is made up of checkers and curious Saracen geometrical forms, sometimes over scrolls and sometimes merely filled up with flowers and leaves in low relief, with diapers superposed, sometimes many deep; by the apposite juxtaposition of blue, red, and gold, the two former tempered with white, the whole mass at a certain distance forms a warm grey, a blue grey, or a red grey, and when you are slightly closer the least change of position brings out a new pattern of a different colour, in a way that is absolutely magical. On a sunshiny day I could watch the changes of pattern and tint at the Alhambra Court of the Crystal Palace by the hour.

The main ideas that underlie Saracen decoration seem to me to have been two-fold—what may be called a poetical passion for flowers, and an intellectual interest in the creation of new geometric forms, too often of maddening intricacy. It seems natural that people who came from sandy deserts should passionately admire flowers, and even if the decorators themselves had never seen a desert, their constant perusal of the Korân would suggest it; for besides the black-eyed houris of paradise, there is a constant reference to gardens with rivers flowing beneath them, to shady trees, to flowers, and fruit. Where the flowers, plants, and fruit they chose to copy or conventionalise came from, I know not, but the bulk of them are like nothing else one has seen, and no travelled botanist seems ever to have attempted a solution. It is only natural that the Saracens, who had made great advances in geometry, should have delighted in their own geometrical puzzles, for though they cultivated their intellect at the expense of their taste, they had an excellent excuse. No mosque could have in it the representation of any living thing, and no pious Moslem could tolerate such representations in the decoration of his house, furniture, or utensils, so architects and decorators must have been hard put to it to gratify their employers' taste for richness and magnificence. They might, it is true, have elaborated a new system of floral decoration, though hitherto that has been dull when not associated with animals or man, but they took up with studies that were rather intellectual than artistic. They found the solution of these problems in æsthetic geometry, and this, to some extent, supplied the want of the human figure, for the beholder, when tired of the mere gorgeousness, could endeavour to solve the geometric puzzle. When once the Saracens had started on this line, there was the pride of the inventor on the one side, and the pride of the possessor in having a new invention of his own race, on the other. If these geometric ornaments had been much uglier than they are, the Saracens could have made Touchstone's boast,—"An ill-favoured thing, Sir, but mine own,"—just as some people in England admire the engine-turning of a watch, and think it is artistic ornament. Their ornament seems to me, as a rule, to treat floral forms in a coarse and commonplace way; there is none of the style and preciousness of nature in them.

The best Greek, Roman, and Renaissance sculptors and decorators extracted, as it were, the essence of floral beauty, while I have never seen a single piece of floral ornament from the Alhambra,—except, perhaps, the capitals,—that I should care to possess. It must, however, not be forgotten that the object was to make a superb mass of coloured decoration, so that if we merely look at the ornament as means to an end, elegance of floral form was of secondary importance. As a mass, however, these forms occasionally have a very bad fault,—they look as if they were crawling, which is as agreeable to look at as a pan of live eels. Some of their patterns, however, are superb, both in composition and colour. I may instance that on the panels of the Hall of the Ambassadors, composed of two similar meanders reversed, touching one another and interlacing; the pointed ovals formed by the meanders have heart-shaped pieces at the bottom from which spring two of those Saracen twin leaves, the upper leaves having scrolls; a single leaf springs from each of these, crosses the meander and goes into the adjoining heart; in the space of the oval thus left is a reversed shield covered with floral ornament on a small scale; the bands of the meander have wide edges, and the centre is filled in with a text in cursive characters; the whole ground is red; the grounds of the meanders, shields, and leaves are blue; the leaves are ribbed, and all the inscriptions, ribs, and patterns on the shield and edges of the meanders are gold. The branching leaves bind each alternate oval together and break up the monotony of the meander, and the whole is a broken surface of gold and blue, with a few bits of red as jewels; while the hearts, the top of the oval, and a piece of the shield are of massive gold. Naturally, imitation has had a great deal to do with the emergence of their style of ornament; the strongly-ribbed leaves of Byzantine carving seem to have taken the fancy of the Saracens; almost all underlying leaves are so treated, and some look as if these were meant for the edges of leaves not yet quite unfolded; these edges or ribs are blue if the leaf is white, but if the leaf be red or blue the ribs are gilt, thus texture is got, and also those broken bits of colour which are very valuable as contrasts to larger masses of pure colour and gold.

The Byzantines seem to have taken a good many interlaced patterns from the ropes and wickerwork of the Northern nations, besides those they had from Greece and Rome; these were greatly adopted by the Saracens, and were made more intricate.

I mentioned that in the great mosque at Cordova the arches were mostly rusticated by



[*See page* 141.]

projecting stone voussoirs alternating with red brick, the ornament being confined to the stone rustications. This characteristic method of decoration is continued at the Alhambra, only the ornament is pure Saracenic and is applied to every voussoir, as may be seen in the flat arches of the court of the mosque. The horseshoe arch of the niche has every voussoir carved, and their circular heads form the cusping of the extrados of the arch, the intrados being ornamented with crockets, and the whole was painted and gilt.

The later Saracens of Spain had no feeling for plainness, nor did they appreciate its value in heightening the effect of the ornamented parts, as the Greeks did; for every square inch is covered with ornament, except the marble shafts of columns, which were gilt; but they understood the value of gradation better than any other people have done.

Considering that by their religion the Saracens were debarred from using human or animal forms, we must admire the consummate art with which they covered the whole of their interiors with arabesques, and yet varied the patterns and relief so that the patterns fulfilled the duties of separation and prevented the eye from being satiated and disgusted with their monotony.

Little as I admire their stalactites, it must be admitted that by these they were enabled to accentuate certain parts, and thus redeem the whole from distressing uniformity of relief. Hate Saracen ornament as you may, every judge of decoration must admit that the Saracens knew every trick of the trade,—large surfaces of flat ornament are redeemed from dulness by projecting shields or panels, whose ornament is large enough to give a marked preponderance of accent. I believe they were the inventors of superposed ornament, which was used with such effect in inscriptions, and you may note with what art they used the different sorts of writing. A band of the stiff and monumental Cufic is often followed by another in the African or in cursive letters. I should only weary you if I attempted to describe the thousand devices by which they secured the desired effect. One phase of the subject has particularly struck me,—the enormous variety of patterns and ornament. It seems unlikely, if not impossible, that any body of men could be gifted with so much off-hand invention. We may be sure that these fighting despots, whose power and life were held by the slightest tenure, were not to be put off by the architect, mason, plasterer, or decorator saying he had to design the building, the construction, the carving, the plastering, or the painted ornament. The Sultan, or ruler, or captain probably sent for the architect at his sitting in the morning, gave him a sheet of parchment, and told him to make his design then and there, and if it was approved, a sum of money was handed to him, and he was told to hire men, and to begin at once: probably to carry on the work night and day. I imagine that the palaces built in one night by Jins, Ons, and Marids were suggested by this practice. The same thing possibly happened to the plasterer, the painter, and the goldsmith who did the gilding, only the employer probably did not have a design, but merely mentioned the sort of effect he wanted. Yet the decoration of each hall must have been under the guidance of one master mind; it could not have been done in pieces haphazard. The whole of each hall is so designed as to be properly effective as a whole, with certain parts more accentuated than others; I therefore come to the conclusion that the decoration of halls like those of the Alhambra, though probably on a smaller scale, was common; that the master plasterer had one or more designs for halls of a certain size and character, and that he had a staff of men who knew the exact relief required for each part, and that he worked in conjunction with a master painter and goldsmith, who also had staffs who knew exactly what ornament, and what colours, and what gilding to use to this particular plaster pattern. Some of the patterns of the plaster-work may have been kept in stock, but this cannot always have been the case, for some were evidently carved. We see the slabs put up, with the main lines of the patterns only marked on them, in the Court of the Lions and elsewhere.

The late Mr. Lundgren, the artist, told a curious story about plastering. He went to India after the Mutiny to make sketches of the natives, and while in the Punjab with his interpreter, they went into an unfinished tomb for shelter from a storm; the ceiling appeared to be just plastered, and there was an old tub in the tomb; a man with three laths came in and measured the length and breadth of the tomb, he then got on the tub, broke the ends of the laths into different shaped points, and set out some triangles on the ceiling; he then began at one end and modelled with the laths a most elaborate floral pattern in the wet plaster. Lundgren stayed there till the plasterer left, and told his interpreter that this plasterer was the cleverest man he ever met with; the interpreter said, on the contrary, "He is an idiot." Lundgren replied, "I have been a painter for forty years, and I could not do such a thing straight off." The interpreter said, "His father was a clever man,—he could do five patterns; he had three sons,—one could do three patterns, one two, and this idiot could only learn to do one." On this, Lundgren said, "Oh! if he has been all his life doing this one pattern it is not so extraordinary as I supposed."

Illustrations.

STAIRCASE, RENISHAW HALL.

RENISHAW HALL, Derbyshire, originally built in Elizabeth's reign (about 1600), was largely added to at the beginning and end of the eighteenth century. It has always belonged to the Sitwells, the present owner being Sir Geo. R. Sitwell, Bart. The new staircase is erected in the room to the left of the hall, which was originally, probably, the buttery, the staircase being formerly where the drawing-room corridor is now. The walls of this corridor and the ground-floor walls of staircase hall, jambs of arches, &c., are panelled in deal painted white. The staircase itself, including the panelling up the stairs, and on the first floor, &c., is of oak. The door (existing) seen through the arch on the first floor, has new pediment, &c.; it leads to the private drawing-room over the library. The hall is paved with 14 in. squares of black and white marble; the hearth and between the arches being small diamonds of the same materials.

The deal panelling was made by Mr. Geo. Stevenson, of Eckington; the staircase, &c., by Mr. Franklin, of Deddington, Oxon, the "badges" round the tops of the newels being carved by Mr. J. E. Knox, of Kennington. The architect was Mr. Fred. M. Simpson, of Westminster, S.W. The library (part of the old house) has a fine Elizabethan plaster ceiling and frieze.

MOSQUE OF SHAH ABBAS, ISPAHAN.

THE plan and section of this mosque, given here, formed two of the diagrams to Professor Aitchison's third Royal Academy lecture, printed in full in our last issue. His description of the building will be found on page 118 *ante*.*

The section, as will be seen, is taken right through the centre or backbone of the plan, the turn or angle formed in the back portion of the plan being laid out in one plane on the section.

HANOVER SCHOOLS, GILBERT-STREET, GROSVENOR-SQUARE.

THE new Hanover Schools were erected in 1889 for the Hanover parish in conjunction with the parish of St. George's, Hanover-square, to take the place of the old schools in South Molton-street, which had become inadequate.

The site was a free gift in perpetuo to the parish by the Duke of Westminster.

The drawing from which we illustrate the building was hung in the Royal Academy in 1889.

The contract was carried out by Messrs. Turtle & Appleton, of Wandsworth, from designs by Mr. W. D. Caröe.

Accommodation is provided for 110 boys, 110 girls, 150 infants, with master and mistress's residences.

NEW CHURCH, LONG CLAWSON, LEICESTERSHIRE.

THE existing Church of St. Remigius, Long Clawson, being in a dilapidated condition, and devoid of any architectural or archæological detail, it has been decided to pull down the old church and erect a new one, as shown in our illustration. The old church has had north and south transepts, as well as nave and chancel abutting up to its central tower; and in designing the new church the architect has adhered to the original architectural outline and grouping.

The cost of the new church will be about 5,500*l.*, exclusive of taking down and re-hanging the five bells, which is being done by Messrs. Taylor & Sons, of Loughborough.

Mr. John Howitt, F.R.I.B.A., of Nottingham, is the architect.

* The drawings being in use for the Professor's lectures, we were not able to give the illustration last week.

SKELLIG MICHAEL.

AN account was given in the *Builder* for Sept. 12, 1891, of the visit paid last summer to the ancient Celtic monastery on Skellig Michael by the Royal Society of Antiquaries of Ireland and the Cambrian Archæological Association. We now illustrate the very interesting remains at this place by a plan of the monastic buildings, two views, and a measured drawing of one of the oratories. The main outline of the plan is taken from the one in Lord Dunraven's "Notes on Irish Architecture," and the additions were sketched in on the spot last August. The views are reproduced from photographs done by Dr. Norman, of Bath, who has kindly given permission to use them.*

The Great Skellig, or Skellig Michael, is a rocky island in the Atlantic, off the west coast of Kerry, 8½ miles from Bolus Head, which is the nearest point on the mainland. The 6-in. ordnance-map shows the size and shape of the rock, and the position of all the buildings upon it. The island has an area of a little over 44 acres, and consists of two conical peaks rising, respectively, to heights of 714 ft. and 611 ft. above the sea, and joined together at their bases. Between the two peaks is a grassy valley, 422 ft. above the sea, called, on account of its peculiar shape, "Christ's Saddle." There are two lighthouses at the southern end of the island, which are approached from the landing-place at the northern end of the island by a zig-zag road along the edge of the cliff. The monastic buildings are situated just below the summit of the lower of the two peaks, on its eastern side, at a height of 545 ft. above the sea, advantage having been taken of the only piece of ground which is sufficiently level for the purpose.

The present path up to the monastery is through the valley called "Christ's Saddle," which is reached by pursuing the road from the landing-place to the lighthouses for a short distance southwards, and then turning off to the west. The old route was straight up the almost perpendicular face of the cliff from the landing-place, but the lower part has now been cut away in order to make the road to the lighthouse.

At the back the monastic settlement is protected by a retaining wall and the rounded ledge of rock which rises up behind it to the westwards. Beyond this ledge of rock, further west, is a sheer precipice down to the sea. In front, where the slope is less steep, the settlement is surrounded by a dry-built stone wall, forming a sufficiently strong defence in case of attack.

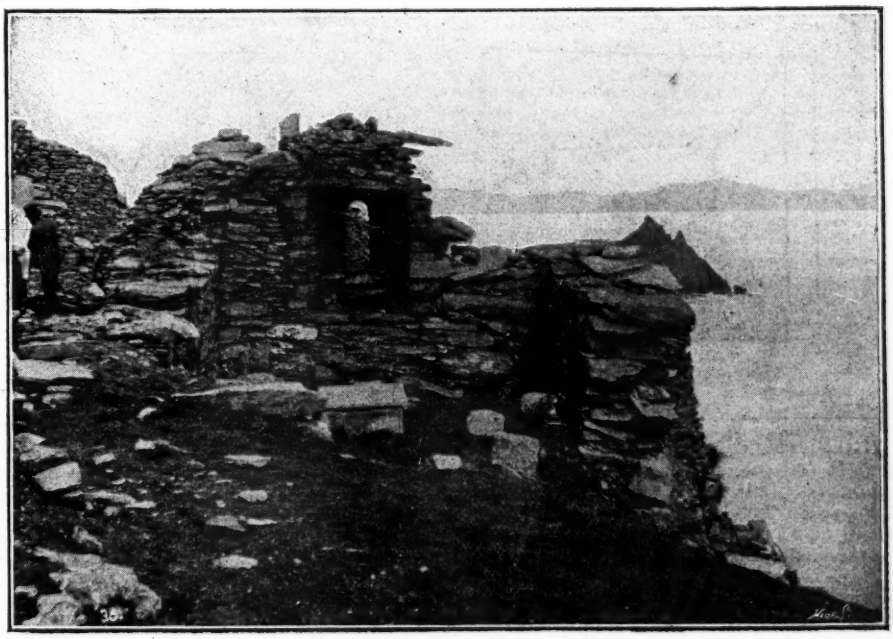
The whole area enclosed measures about 300 ft. long by 100 ft. wide, and the buildings within occupy a space of 150 ft. by 50 ft. The earlier remains consist of six beehive cells, two oratories, two wells, five ancient burial-grounds, and several rude crosses. The church of St. Michael is of later date, and is built with mortar, whereas all the other structures are of dry rubble. The ground, which is highest next the retaining wall at the back, and slopes down towards the east, has been artificially levelled up in a series of steps, so as to form a more suitable foundation for the different buildings. The raised ground is in each case faced with low retaining walls, and rude flights of stairs lead from one level to the next. The photographic view in which the cross appears is taken from a point between cell No. 2 and St. Michael's Church looking northwards, and shows the flight of nine steps leading from the space in front of cells Nos. 1 to 4 to that in front of cell No. 5.

The other view shows the interior of the ruined church of St. Michael, with the Lemon Rock and the coast of Kerry in the distance. It will be noticed that the side wall of the church is built directly over the wall of the cashel or fortress, on the edge of the cliff, and there is an uninterrupted view of the sea below.

Whatever may be the actual date of the remains on Skellig Michael (and it can hardly be later than the eighth century), the type of Christian structure here found is the earliest of which we have any knowledge in Great Britain, exhibiting as it does transitional features between the Pagan and subsequent methods of building, and showing the evolution of the stone-roofed church from the pre-Christian beehive cell. The most primitive form of the clochaun, or bee-hive cell, is probably that which is circular in plan both inside and out. The cells on Skellig Michael are an advance upon this in being rectangular inside, although still retaining the rounded shape outside, but in the oratories an entirely new departure is taken in the adoption of the square corners altogether. The drawing of oratory No. 2 shows the Irish stone-roofed church in this its first stage of development, after emancipating itself from the Pagan traditional methods of building, an advance in style which was eventually to culminate in the design of Cormac's Chapel at Cashel. The oratory is in such a position that it requires a steady nerve to stand beside it and look over the edge of the retaining wall at the sea, hundreds of feet below. One is lost in admiration for the skill and daring of the monkish builders who, with their lives in their hands, could construct a wall actually sloping outwards over empty space, like one side of the Leaning Tower of Pisa. The character of the masonry of this wall is almost identical with that of the celebrated Staigue Fort, co. Kerry. Another resemblance to the Staigue Fort that will not escape the notice of the keen observer is in the ingenious contrivance for relieving the weight on the horizontal lintel of the doorway of cell No. 1, by placing a second lintel above with a small intervening space. Yet, whilst we are struck by constructive features that the Skellig Michael remains possess in common with the Pagan fortresses, the Christian character of the buildings is rendered sufficiently obvious by the crosses over the doorways formed of quartz pebbles, showing up white against a background of dark coloured slate.

* Copies of all the views taken by Dr. Norman during the Kerry excursions can be obtained from Mr. W. Middleton Ashman, 12a, Old Bond-street, Bath.

View on Skellig Michael, showing the Cross and some of the Cells.



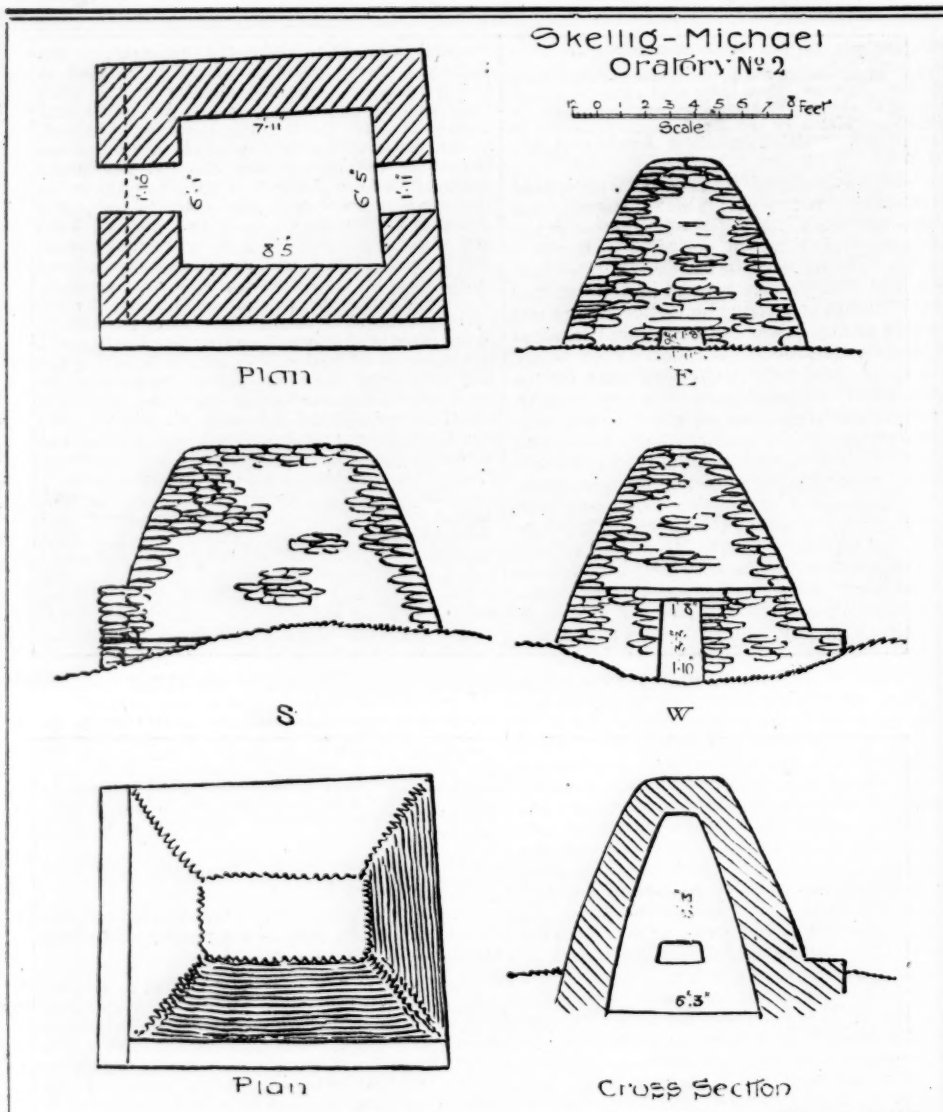
Skellig Michael: Remains of the Church.

DEMONSTRATIONS ON GREEK SCULPTURE AT THE BRITISH MUSEUM.

MISS EUGÉNIE SELLERS gave on the 10th inst. the first of a course of six demonstration lectures on Greek sculpture in relief.

Miss Sellers said that Greek sculpture begins with intense realism, which is in itself hostile to decorative schemes. For example, in the little pediment of poros stone at Athens which represents Herakles slaying the Hydra, there is no centre-figure; while the chariot of Herakles, with complete disregard for decorative effect, is turned away from the centre ready for the homeward journey when the contest is over. Again, in the Harpy Tomb in the British Museum, there is no adequate centre, and the Harpies that should frame in the composition, fly away from the centre, realistically pourtraying the idea of souls passing away in death.

Passing to the consideration of the sculptures of the Temple of Ægina, Miss Sellers incidentally claimed these for Attica, basing her claim on the close resemblance between them and the bronze helmeted head in the Akropolis museum and the beautiful archaic head of a youth, now at Copenhagen, which was found at Athens; and further bearing in mind the fact that Pausanias, — to whom we owe the term "Æginetan art," — had seen scarcely any archaic art, all the statues that recent excavations on the Akropolis have reclaimed being in his day buried under the walls built by Kimon and Perikles. But Ægina still had its archaic sculptures; hence the term *Æginetan* came to be synonymous with *archaic*.



[*See page* 141.]

In the pediments of Ægina the sculptor began to feel the need of a centre, and we find him balancing his figures one against the other with perfect symmetry, but with the unsatisfactory result that they have somewhat the air of ornaments neatly arranged upon a shelf.

In the second lecture, last Wednesday, it was shown that the same principle applies to the pediment sculpture of the Temple of Zeus at Olympia. Again we have the central figure with figures symmetrically arranged on either side; but, for all the beauty of the individual figures, the whole lacks harmony and fusion. As in the old poros stone pediment, chariots form part of the scheme; but this time they are turned inwards, without regard to realism, and stand stiffly on either side of the centre.

In the Parthenon, the central composition of the western pediment shows a great advance. This time, the chariot horses that frame the centre are represented in active movement. But the angles still have that obtrusive symmetry which deprives the grouping of any charm. It is, however, in the eastern pediment where we have figures combined in groups which are themselves subordinate to the central group, that the Greeks approached most nearly to that combination of living forms into patterns which characterises, for example, the work of Donatello in his famous gallery of singing boys.

Miss Sellers here discussed at some length the various interpretations which have been given from time to time of the figures of the East pediment. She would revert to the old interpretation of Nux for the figure commonly called Selene; for in vase paintings it is Nux that drives while Selene rides.* The group often called "the Fates,"—which have been interpreted by Dr. Waldstein as Hestia, Gaia, and Thalassa, she unhesitatingly calls "the Charites," thus obtaining a group of three whose attributes as well as whose attitudes would be closely symmetrical with the figures on the other side if interpreted as the Horai and Dionysus (rather than Olympos)—a combination that appears in the representation of the marriage of Peleus and Thetis in the François vase.

Finally, in the Parthenon frieze,—for all the flow and movement of the sides,—the centre is certainly weak. Mr. Murray suggests that the gods and goddesses are to be conceived as sitting in a semi-circle in a different plane from the procession, which advances in front of them from both sides,—an explanation, by the way, which Miss Sellers applies to the interpretation of the west side of the Harpy Tomb, where, as here, the artist has tried to represent two sides of one scene at the same time,—but no archæological knowledge gets rid of the fact that the eye, in travelling rapidly on with the procession, is checked by the disagreeable impression of those five inadequate vertical figures, on whom the gods are turning their backs.

** The head of the "Selene" horse quite allows of the supposition of a rider instead of a driver.—ED.*

ARCHITECTURAL SOCIETIES

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—A social gathering of the members of this Society was held on the 15th instant, in the Law Institute, Albion-place, Leeds. A collection of drawings and sketches of architectural subjects was hung on the walls. Mr. Frank Bedford showed the collection of sketches of Italian and Spanish architecture he had executed while on a tour of study on the Continent, and Mr. H. V. Lancaster, who has also studied and sketched abroad, exhibited some drawings. Other sketches were also shown by Mr. W. J. Mettam and Mr. Carby Hall (secretary). Specimens of wood and ivory turning, by Mr. H. B. Buckley, were also exhibited.

EDINBURGH ARCHITECTURAL ASSOCIATION.—On the 11th inst. the Edinburgh Architectural Society met in the hall, 42, George-street, Edinburgh, under the chairmanship of Mr. John Kinross. Mr. James Bruce, W.S., Edinburgh, moved that the Association, in acknowledging the communication from the First Commissioner of Her Majesty's Board of Works, intimating that he had caused a sum of 250*l.* to be provided for the "urgent and special repair of the Palace of Linlithgow," thanked him for having taken action in the matter, but felt that the thorough repair of the entire fabric was the only proper course, and begged to represent "that such thorough repair could only be carried out by replacing the burnt timbers and flooring, re-glazing the windows, and covering the whole with a roof, so that the walls might be firmly tied together, and the whole rendered wind and water tight." He said that the sum of 250*l.* was utterly inadequate for the purpose they aimed at, and they, as Scotsmen, should insist upon that palace being put into proper order.—Mr. Ross seconded the motion, which was supported by several members, and agreed to.—The Council of the Association, under remit from the last meeting on Mr. G. S. Aitken's motion regarding the removal of the Wellington statue, recommended that the Association should take no further steps in the matter. This recommendation was unanimously adopted.—Sheriff Mackay then read a paper on "The Architecture of Scottish Towns as illustrating Scottish History." Taking the four periods of Scottish history—the Celtic-Roman, the Celtic-Saxon, the Scottish-Norman or Feudal, and the British or Modern,—he described the known architectural charac teristic of each. The Celts, he said, had no architecture prior to the Roman invasion, and it was not until after that event that there occurred the transition from the Scottish manner of building with wood to the Roman manner of building with stone. The Roman influence, however, upon town architecture was nil. The Celtic-Saxon period was the era of the origin of the earliest Scottish towns,—their sites being fixed near castles, river mouths, and (at a later date) cathedrals or churches,—but scarcely a vestige of their style of architecture remained. The third period was contemporaneous with the form of Gothic or Norman architecture prevailing from the time of David I. to the Reformation, which put an end to the feudal character of the Church, and to the Revolution, which put an end to feudalism in the State. The signs of advance in architecture were seen in churches, colleges, palaces, and private houses. In the last or modern period the Revolution settlement, and the Union in 1707, led to the development of Scottish burghs. After the Rebellion of 1745 the feudal burghs burst their bonds, new towns and new architecture afterwards arose, and, as time went on, a higher standard of comfort, produced by increased wealth, preceded a higher standard of art.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this society was held on the 9th inst., the Honorary President, Mr. W. Forrest-Salmon, in the chair, when a demonstration was given by Mr. Francis H. Newbery upon "The Architecture of the Human Figure, and its Application." He referred to the besetting weakness of architects' undue regard for precedent, exemplified chiefly, perhaps, in their reproduction of the Classic orders by means of a unit of measurement,—the module,—found in the half-diameter of the column. For encouragement he instanced the modern development of sculpture and figure-painting. At one time the human form was studied in the same exact but, withal, mechanical way. It had been discovered than in Egyptian representations of the figure the unit was the middle finger. In Greece the principle was further elaborated, and the palm, and then the head, taken as the multiple for all the proportions of the body. Leonarda da Vinci, a great artist, did not scorn the aid given by a knowledge of the normal proportions of the body as codified, but he went further, and to acquaintance with antique canon added the study of nature at first hand. Mr. Newbery's "application" was that, beyond the precise analysis of past styles, the architect must appreciate the human figure, Nature's supreme example in proportion, symmetry, and beauty of line, if his architecture is to advance from academic correctness to the artistic realisation of Nature's principle in its proportion. The demonstration was given on the blackboard.—Mr. Keppie opened the discussion which followed, and at its close a hearty vote of thanks was awarded Mr. Newbery.

CHICAGO EXHIBITION.—We are officially informed that the British railways have undertaken to carry goods for British exhibitors at the Chicago Exhibition, to and from the port of shipment, at half rates. The American railways will charge their usual rates to Chicago, but will bring back the goods free at the close of the Exhibition. Many of the principal steamship companies have reduced their rates considerably, and will take freight for the Exhibition at 11s. per ton. Many of them have also consented to adopt a reduced passenger tariff for exhibitors and their *employés*, certified as such under the authority of the Royal Commission.

COMPETITIONS.

THE COXLODGE ASYLUM EXTENSION.—On Wednesday afternoon, at a meeting of the Coxlodge Asylum Committee of the Corporation of Newcastle, it was announced that the professional assessor, Mr. G. T. Hine, had reported that eighteen sets,—with four alternative plans, making twenty-two in all,—had been sent in. The successful competitors were, in his opinion, to be placed in the following order:—1. Motto, "Norstan," Mr. J. W. Dyson, Grainger-street. 2. "Compact," Messrs. Montgomery and Carr, Grainger-street. 3. "Order," Mr. W. L. Newcombe, Pilgrim-street. 4. "Northumbria" (second plan), Messrs. R. Knill Freeman and S. R. Robins, Grainger-street. The committee are to meet again shortly to consider the report of Mr. Hine. The cost of the extension is expected to range from 70,000*l.* to 80,000*l.* The competition was confined to Newcastle architects.

BOROUGH LUNATIC ASYLUM, SUNDERLAND.—At the meeting of the Sunderland Town Council on the 10th inst., the Visiting Committee of the Borough Lunatic Asylum recommended:—"That the common corporate seal be affixed to agreement for purchase of land at Ryhope as the site for the Borough Lunatic Asylum. That the Town Clerk take all necessary steps for obtaining the approval of a Secretary of State to such agreement. That Mr. C. H. Howell, architect to the Commissioners in Lunacy, the assessor, having reported that, after a careful examination of the drawings submitted for the proposed Borough Lunatic Asylum, he is of opinion that the designs marked as follows should be awarded the prizes in the undermentioned order:—1st, Scio; 2nd, Turpi Secernis Honestum; 3rd, X. The Committee have so awarded them, and they recommend that No. 1 plan, "Scio," be adopted for the asylum and forwarded to the Commissioners in Lunacy, subject to an arrangement being previously made with the author thereof as to the architect's commission, &c."—Ald. Shadforth moved the adoption of the report, and proposed that the first should be adopted as the plan for the asylum.—Mr. Bruce seconded the motion.—Ald. Swan moved that the matter be adjourned for a fortnight, so that the members of the Council should have an opportunity of seeing the plans.—Mr. W. Sanderson seconded the amendment, which was put and lost.—Ald. Swan then moved that the Council ought not to be asked to approve of anything which they knew nothing about, and under the circumstances he suggested that a special meeting of the Council be held on Wednesday, the 17th, to consider the matter. This was agreed to.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Sir John Lubbock, presiding.

Tenders.—Tenders were received for the construction of the Hackney-wick, &c., relief sewer, and for the erection of a new Fire Brigade Station at East Dulwich. The lists will be found on another page.

Proposed Appointment of a Parks Superintendent.—The General Purposes Committee presented the following report:—

"Under the resolution of the Council of November 3 last*, an advertisement was issued inviting applications for the post of Superintendent of the Council's parks and open spaces, at a salary of 700*l.* a year. The applications were in the first instance considered by the Parks Committee, who at our request submitted to us the names of the three candidates whom they considered the most suitable for the appointment. The three candidates selected by the Parks Committee were Lieut.-Colonel F. Bailey, Colonel I. C. Walker, and Mr. C. J. Ponsonby. Having seen the three selected candidates, and weighed their respective merits and qualifications, we recommend—

'That Colonel Inches Campbell Walker be appointed Superintendent of Parks and Open Spaces, at a salary of 700*l.* a year, upon the following conditions—That he do hold his office during the pleasure of the Council; that he be required to give his whole time to the duties of his office, and be not allowed to take any private business; that any fees received by him either as a witness or in any other capacity be paid to the Council; and further, that he do accept the condition that on retirement he shall not be entitled and shall not make any claim to any superannuation or pension, and that he will submit to any general scheme which the Council may adopt with respect to insurance for pensions or superannuation.'"

* See *Builder* for October 31, and November 7, 1891.

Mr. Corbett moved, as an amendment,

"That, as it was stated in the advertisement for a Parks Superintendent that the age of candidates must not in any case exceed fifty years, and as two of the selected candidates exceed that age, the question be referred back to the Committee for further consideration."

In the course of the long and somewhat acrimonious discussion which ensued, the Parks Committee was criticised by some of the members for not having stated in their report that two of the candidates, Col. Walker and Lieut.-Col. Bailey, were beyond the prescribed age. Whether the strict limitation of age was desirable or not, it was contended that to adopt the recommendation of the Committee would be to break faith with other applicants for the appointment. Apart from this irregularity, however, many members objected to any such appointment,—to the creation of any such office. They urged that the existing Park Superintendents having charge of individual parks had shown themselves to be men fully competent for their posts. This was not denied by the Committee and its supporters, but it was urged that admirably as the individual Park Superintendents fulfilled their duties, the proposed new officer was much wanted in the interest of efficiency, economy, and uniformity of administration. To this it was replied that Messrs. Sexby and Nairn, two officers in the employment of the Council,—one in the Architect's department and one in the Clerk's department,—had managed the work of supervision very well. On behalf of the Committee it was rejoined that the existing state of things had only been made passably satisfactory through the untiring vigilance and unremitting supervision of members of the Committee. Some of the members of the Council who were not on the Committee advocated the appointment of a general superintendent of parks and open spaces, on the ground that there had been great mistakes made in the laying-out of the new park at Dulwich,—mistakes which they feared would be repeated in Waterlow and other parks. On being put to the vote, Mr. Corbett's amendment was carried by a large majority over the recommendation of the Committee. On being put as a substantive motion, several new amendments were proposed and lost. One of these amendments was to the effect that Mr. Ponsonby, who, it was said, fulfilled all the required conditions, should be appointed to the post. It was stated that, while possessing all the knowledge of forestry possessed by the other two candidates named, he was under fifty years of age, and had a knowledge of horticulture and landscape-gardening. This amendment was lost by a large majority, and ultimately Mr. Corbett's amendment was adopted as a substantive motion. The question was therefore referred back.

Appeal by the School Board against an Order of the Shoreditch Vestry.—The Report of the General Purposes Committee also contained the following paragraph:—

"We have to report that, acting as the Statutory Appeal Committee appointed under Section 212 of the Metropolis Management Act, 1855, we have heard an appeal by the School Board for London against an order of the Vestry of Shoreditch, requiring certain water-closets proposed to be erected at the Board schools in Shap-street, Kingsland-road, to be separately drained with a separate trap, pan, and water supply for each water-closet. Having heard the parties for and against, we came to the conclusion that the order of the Vestry should be varied, and we accordingly passed the following resolution:—

'That the order be varied by allowing the construction of the water-closets as proposed by the School Board, provided that the Board construct the water-closets so that the flushing of the troughs shall take place automatically at intervals of every half-hour during the day, commencing with school hours, and ending half an hour after.'"

The Bar at the Top of Gower-street.—The Improvements Committee again brought up their report on this subject, which was not adopted at last week's meeting, as we inadvertently stated on p. 125, *ante*. The following is the text of the report, which we did not print last week:—

"We have received a letter from the Vestry of St. Pancras stating that the authorities of University College and Hospital are willing to give up for the sum of 15,000*l.* the land in front of the Hospital, with a view to the opening up of the line of communication north and south through Gower-street, and asking the Council to contribute 10,000*l.* towards the cost. The land referred to has an area of 1 rood 4 poles 27 yards, is situated between Grafton-street and University-street, and divides University Hospital from University College. The Hospital authorities claim the ownership to the land, and though they permit it to be used by foot passengers (save on one day in the year) they can at any time close it to traffic, and utilise the land for building purposes. Indeed, at the present time the Hospital authorities are anxious to reconstruct their Hospital, and in the event of their so doing it is open to them to use the land which they now offer to sell, and thus prevent the opening up of Gower-street. We have satisfied ourselves that the authorities possess the freehold of the land to the exclusion of any public right of way across it, and we are, therefore, of opinion that the present opportunity for acquiring it should be seized. The Vestry has agreed, in the event of the Council contributing the 10,000*l.*, to undertake all further expenditure, including the cost of making the roads and footways over the land. The price asked for the land may, from one point of view, appear somewhat excessive, but we would point out that in the event of the Hospital authorities acquiring the property on the west side instead of this area, they would certainly have to expend a larger sum than 15,000*l.* The removal of the bar in Gower-street and the opening up of a direct line of communication between New Oxford-street and Euston-road would be a great public advantage, and in harmony with the avowed policy of the Council respecting the removal of gates and bars. We can confidently advise the Council to accede to the request of the Vestry, particularly as if this opportunity be suffered to pass, it may never occur again. We recommend,—

'That, subject to an estimate being submitted to the Council by the Finance Committee, as required by the statute, the Council do contribute 10,000*l.* towards the cost of opening up the line of communication north and south through Gower-street, such contribution to be made on the usual conditions with regard to contributions to improvements undertaken by local authorities.'"

The recommendation was now agreed to without discussion.

York Water-gate.—The second report of the Parks and Open Spaces Committee contained the following paragraph:—

"We have had our attention called to the partially dilapidated condition of the York Water-gate at the bottom of Buckingham-street and adjoining the Victoria-embankment-gardens, and also to the untidy condition of the ground around it. There is no beneficial ownership in the gate, and the persons who are, or claim to be, in possession of it consequently take no steps to keep it in proper order. We have no desire to alter the ownership of the gate, but having regard to its position as a monument of the past and an object of public and architectural interest, we think that the Council would be quite justified, as it forms a feature of the Victoria-embankment-gardens, in undertaking its future maintenance. We therefore recommend,—

'That the Council do direct the Parliamentary Committee to insert a clause in the next General Powers Bill to enable it to maintain the York Water-gate next the Victoria-embankment-gardens.'"

The recommendation was adopted *nem. con.*

The Inhabited House Duty.—Mr. Beachcroft moved:—

"That, in the opinion of the Council, the Inhabited House Duty should cease to be an Imperial tax, and should be substituted for the share of the Probate Duty grant now carried to the local taxation account, so that the amount actually leviable in respect of house duty in the County of London may be appropriated to the County Fund, and that a representation to this effect be made to the Chancellor of the Exchequer."

After some discussion, the motion was referred to the Local Government and Taxation Committee, and the Council adjourned shortly after six o'clock, having got through its business an hour earlier than usual.

THE SANITARY INSPECTORS' ASSOCIATION.

THE ordinary monthly meeting of this Association was held on the 6th inst. at Carpenters' Hall, London-wall, when an address was delivered by the Medical Officer of Health of the Staffordshire County Council, Dr. Geo. Reid, D.P.H., an hon. member of the Association. Mr. Hugh Alexander, Chairman of the Council, presided, and there was a good attendance of members.

The lecturer selected for his subject "Infection and Disinfection," and, in his treatment of it, he limited himself almost exclusively to two salient points,—(1) the nature of contagion and its phenomena, and (2) methods of prevention by disinfectants. We had long passed, he said, the epoch of curious hypotheses as to the causes of infection, and we now knew that certain kinds of disease were propagated by low forms of animal life, which were known as germs. The existence and the various shapes and forms of these organisms,

though mostly so minute as to be invisible to the naked eye, had been in various ways demonstrated. These organisms, or their spores, which were more difficult to kill than mature germs, often clung for a long time to clothing, remaining perhaps for a considerable period in a state of suspended animation for want of proper food. It was still a moot question whether such germs had a spontaneous origin or were only to be found after an antecedent case of sporadic disease, and as there were facts to support both theories of origin, it might be possible that they had a double development. Whatever might be the truth as to their origin there was no doubt that an atmosphere of dirt, moisture, and a certain temperature were necessary conditions of their existence. As fish could not live in water without air, so these morbific germs could not live in the air without filth; and ozone, as their distinguished President so often maintained, was fatal to them. Armed with that knowledge, and knowing also where to look for the conditions of filth, the inspector would be in a position to fight the evil and to conquer it. An infected person was a centre of contagion, and from him, by means of the breath, emanations of the skin, secretions, contact with clothing or through water, milk, food, or air, it might be communicated indefinitely from person to person. The different ways in which the same or different diseases had been communicated in observed cases were illustrated by diagrams. Disease in animals played an important part in the spread of epidemics, particularly tuberculosis, diphtheria, and scarlet-fever. Entering upon the second portion of the subject, the lecturer explained by means of a table the effects of dry and moist heat at different degrees of temperature upon the bacilli, and stated the various times required to destroy life in them under the different conditions. Moist heat at 212 degs. Fahrenheit effectually destroyed germs after five minutes exposure, which would require from one to four hours with an exposure up to 220 degs. in dry heat; the former was therefore to be preferred to the latter. It was fortunate that they now knew enough of the habits of the enemy to follow him to his haunts and combat him successfully, but they were heavily handicapped in the fight by the ignorance of the public and the apathy of local authorities.

On the conclusion of the lecture, a vote of thanks was proposed by Mr. F. G. Bell (Epping), and a discussion took place in which the Chairman, Mr. West (Walthamstow), Mr. Dee (Westminster), and other members took part. The motion having been carried by acclamation Dr. Reid briefly replied in acknowledgment.

CLERKS OF WORKS' ASSOCIATION:

ANNUAL DINNER.

THE ninth annual dinner of the Clerks of Works' Association of Great Britain was held on Monday evening last in the Venetian Saloon of the Holborn Restaurant, Mr. Aston Webb, F.R.I.B.A., in the chair, supported by Mr. F. T. Baggallay, F.R.I.B.A., President of the Architectural Association; Mr. Wyatt Papworth, F.R.I.B.A.; Mr. T. H. Watson, F.R.I.B.A.; Mr. C. Stanley Peach, F.R.I.B.A.; Mr. Thomas F. Rider (Rider & Sons), Mr. Joseph Randall, Mr. Edwin Brooks, Mr. J. Merifield, Mr. J. Brady, Mr. F. Dashwood, and many other gentlemen.

The Chairman, in proposing "The Queen and Royal Family," feelingly alluded to their recent bereavement. It was sometimes said, he continued, that the Victorian Age would not be remembered much as an age of art, but that its chief claim to remembrance would be its scientific and engineering achievements. Without wishing to decry the latter, he thought that there was something to be said on behalf of architecture, for an age which had produced the Houses of Parliament and other prominent public buildings, and which had produced architects such as Sir Charles Barry, Sir Gilbert Scott, George Edmund Street, Alfred Waterhouse, Norman Shaw, and many others whom he might name, could not be said to be undistinguished in architecture.

The Chairman next proposed "The Army, Navy, and Reserve Forces," coupled with the name of Sergeant J. M. Jefferson, who briefly responded.

Mr. G. Dalton, in a humorous speech, proposed "The Architects and Surveyors," coupled with the names of Mr. C. Stanley Peach, F.R.I.B.A., and Mr. Stanley Clarke, both of whom, in replying, spoke of the indebtedness of professional men to clerks of works.

The Chairman, in proposing the principal toast of the evening, "The Clerks of Works' Association," said that he was glad to find that the position of the Association was a most favourable one. He understood that it now numbered 130 members, and that it had been established ten years. The members had gradually increased, and during the past year there had been an increase of ten. The Association appeared to be in the happy position of having an income slightly in excess of its expenditure, and to be able to place to reserve something every year, although there was no absolute necessity for them to do so. The advantages of the Association were thoroughly known and appreciated by the members of the architectural profession. The register of competent clerks of works which the Association kept was one which was now pretty well known and resorted to by most architects in search of capable clerks of works. The Association was to be congratulated on the publication of its useful little *Journal*, which contained a great deal of valuable practical information. Another advantage which had been gained by the establishment of the Association was the opportunities which it afforded of enabling the members to make each other's personal acquaintance and to exchange opinions and experiences. He did not know whether the Association had in connexion with it any benefit society or club, for mutual assistance in case of illness, accident, or other misfortune, but if they had not, they had possibly already given attention to the subject. He was very glad to notice, in reading their *Journal*, that they were fully alive to the importance of technical education, and that they were co-operating with Prof. Banister Fletcher and the Carpenters' Company, in that desirable work. He would impress upon them all, and especially upon their younger members, the great importance, and, indeed, the absolute necessity, of keeping abreast of the times. Every decade of the present century had brought forth some invention, some improvement, some important progress, and it therefore behoved clerks of works, as well as architects and builders, to make themselves conversant with every new thing, as far as they possibly could do so. He had been asked to say something on the question of salary, but that was a rather delicate matter. He was not one who thought that the salaries of clerks of works were always adequate, but he did not think it would be possible, with advantage to themselves, to fix a uniform salary which all should receive. As he apprehended, the Association had no such object in view; it was not, in fact, a trade union. He believed that a thoroughly capable and experienced clerk of works would generally be able to obtain employment at such a salary as his merits entitled him to receive. He thought there were indications that the position of clerks of works would before many years be much better than it was at the present time, for it was probable, and even possible, that their functions would be greatly extended. There were growing signs of the tendency to divide the work of erecting a building into the several trades, and the general contractor seemed to be on the wane. If that were so the probabilities were that the clerk of works would become more and more in request, and he would have greater and greater responsibilities thrown upon him. With the toast he had much pleasure in coupling the name of Mr. J. Brady, the President of the Association.

Mr. Brady, in responding, said that with regard to the subject of a benefit club or society, they had considered that matter at first, and determined to exclude it from their programme, wishing to make membership of the Association independent of all pecuniary considerations, save, of course, the payment of the annual subscription. But they did not in the least wish to disparage other societies which adopted a different course on that matter.

Mr. F. Dashwood, secretary, in a humorous speech proposed "The Worshipful Company of Carpenters," coupled with the name of Professor Banister Fletcher, who, in replying, referred to some criticisms which had appeared in the Association's *Journal* concerning the examinations at Carpenters' Hall.

Other toasts followed, including "The Hon. Treasurer" (Mr. J. Oldrid Scott, who was, we regret to learn, unable to be present through illness); "The Press" (coupled with the name of our representative); "The Visitors" (coupled with the name of Mr. F. T. Baggallay, President of the Architectural Association); and "The Chairman" (proposed by Mr. R. Wheeler).

BRETT'S AUTOMATIC REVERSIBLE SASH.—This sash, the invention of Mr. A. Cutting, is a form of reversible sash-action which has the merit of being exceedingly simple in its working, containing nothing that is liable to get out of order. In place of the rebate at the edge, there is a loosely-fitted lath of brass or other metal working in a slot in the side of the sash, and when the sash is closed, fitting loosely into another slot in the frame. A small bar on this lath projects through the frame at each side, and by a knob or handle can be raised and by the same action drawn inwards obliquely towards the centre of the window, when the lath leaves the window-frame slot, and the sash is free to swing round on centre bearings. On returning the sash to its place the metal lath drops automatically downward and outward, by its own weight, into its place, being guided outward by the oblique line of the slits in which the bars carrying the handles work. The make of the sash is very inexpensive.

Correspondence.

To the Editor of THE BUILDER.

COKE BREEZE CONCRETE.

SIR,—I am much surprised at the opinion expressed by Mr. Potter in your last issue as to the suitability of coke breeze for concrete, and as to the strength of concrete made with it. The use of breeze for concrete is not known in my neighbourhood, though there is plenty of breeze to be had, hence my wish to get practical opinions about it. I proposed to use it for the floor-slabs and walls of artisans' dwellings in consequence of seeing in one of the papers of the Royal Engineers a report of experiments on concrete beams from which it appeared that a beam made with "gasworks breeze" was much stronger than one made with "gravel screened to 1 in. and washed," the proportion of cement being the same in each case,—perhaps some other experiences of the use of breeze for concrete will be given. I regret that my inquiry as to the sizes of rooms that can be spanned by flat slabs of concrete without iron joists, and with practical safety, has not received other replies than that kindly given by Mr. Potter, as this is a point upon which definite practical experience would be of great value, and especially so as it may now, I think, be taken as experimentally proved that durable floors can be formed by nailing deal flooring direct on such concrete slabs, without leaving air-spaces, and so doing away with timber joists entirely. If, as Mr. Potter states, breeze is a bad material for making a strong concrete, his suggestion of forming the lower portion of the floor-slabs of an aggregate that would make a stronger concrete, and putting a layer of 1½ in. of breeze concrete over it to nail into, is good, but I cannot see the use of postponing the laying of this layer until after the lower portion is dry; on the contrary, it seems to me, that it would be very much better to lay, say, 4½ in. of the strong concrete, roughly levelled, and at once to lay on it the breeze concrete, properly levelled off to receive the boards, so that the two layers would be practically incorporated into one mass, and the whole would dry out together. In the records of some experiments on concrete floor-slabs, it is stated that they were wetted daily for a week after they were laid. Is this an advantageous thing to do? Perhaps some further and more definite practical experiences may be given by your readers on this important subject. In the particular case in which I am interested the rooms are 13 ft. by 14 ft., surrounded by 8 in. walls.

1. Can such such rooms be safely spanned by 6 in. slabs of coke breeze concrete, gauged, say, 5 to 1 of best Portland cement,—on which the flooring would be nailed?

2. If not, would the necessary strength be secured by using broken brick or other material, instead of breeze, for, say, 4½ in. thick of the slabs, as suggested above? SURVEYOR.

AIR-BOUND PIPES.

SIR,—Can any of your readers instruct me how to cure above? The cold main outside my house is only a three-eighth pipe, whilst my service from it up to cistern is ½ in., with branches half-way up to lavatories, &c. The hot-water pipes from cylinder to bath, &c., have no after circulation. When the hot-water taps are turned, lowering the water in cylinder and cistern, a terrible noise, like a foghorn, sets up, and continues till it is relieved by turning the cold on also, and letting it run for some time; the cold pipe vibrating violently.

What is the cause, and what is the simplest cure? FOGHORN.

*** From the above letter we gather that the service of water to "Foghorn's" residence is constant and not intermittent; what is generally known as "constant supply." This being the case, the cause of the noise is not far to seek, although it is due to something that might not in the general way be readily thought of. The noise and the vibration engendered proceeds from the ball-valve in the cold-water cistern.

This peculiar trouble is not very frequently experienced, and it does not follow that it proceeds from the same cause in every instance, but on the few occasions it has come to our notice it has in each case proceeded from the ball-valve, and has been easily remedied.

If "Foghorn" opens one of the hot-water taps and then (while the noise and vibration are proceeding) places his ear as near as he conveniently can to the ball-valve in the cold-water cistern, he will doubtless come to the conclusion that this is the seat of the trouble. He rightly likens it to a foghorn, for the noise is due to a similar cause,—viz., the passage of a fluid through a narrow aperture at high pressure. If there is any doubt, let him either lift the ball of the valve to close it or press it down to fully open it, and the noise will cease if the trouble proceeds from the cause that our experience has shown us.

The remedy is to change the ball-valve for one of a different pattern, or to check the pressure of the water before it arrives at the ball-valve. This latter could be done by inserting a stop-cock and partially

closing it, or choking the pipe in some way, or reducing the passage way in the tail part (not the outlet) of the ball-valve; but in adopting a remedy every consideration must be given as to what "Foghorn's" water company will be agreeable to.

It will be plainly seen that the opening of a cold-water tap must relieve the pressure at the ball-valve, for the cold-water taps are all in direct connexion with the supply-pipe, and take the water at a lower point. This relief, as "Foghorn" states, proves sufficient to cause a cessation of the noise. It is, of course, understood that this trouble is due to the water flowing in from the main the instant water is drawn from the cold-water cistern. This scarcely ever permits of the ball-valve opening to its full extent; if it did, then there would be no troublesome noises (assuming the ball-valve was of sufficient size)—no more than happens when the cistern is filled once or twice a day upon the intermittent system. This, it must be repeated, is the probable cause, to the best of our experience, but it does not follow that it is the correct solution in every case.

The Student's Column.

WARMING BUILDINGS BY HOT WATER. VIII.

EXAMPLE WORKS (HORTICULTURAL.)

IT must be clearly understood that these examples do not represent copies from which other works can be carried out, as in the first place the sketches are merely imaginary requirements. But in explaining these, the principle and general idea of the work can be correctly described, and this is all that is needed. When an apparatus has to be put up it is best when, or after, viewing the place to plan the arrangement of pipes, their disposition and quantity, without reference to any suggested examples, as in no two cases are the requirements exactly alike. This may sound as if the examples about to be given would convey no useful information, but this is not the case, for without dealing with a few complete works it is hard to convey to the inexperienced mind the connexion between the different separate subjects treated.

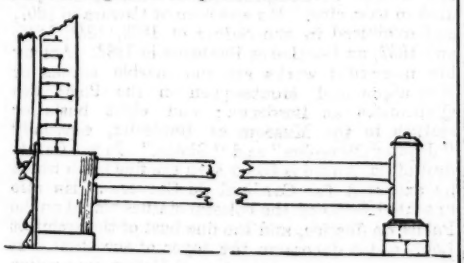


FIG 26.

The first example, fig. 26, shows about the most simple apparatus we have with a boiler in which coke or coal fuel is used. This does not represent the smallest style of boiler by any means, but the whole erection is simplicity itself. This simple structure is due in a great measure to the boiler, which is of the "Loughborough" pattern. This boiler, which has now been in use some little time (and will be referred to more fully presently), is of a shape which permits its being built in the substance of one of the walls of the greenhouse or conservatory. By this method of fixing the front of the boiler, with its feeding and stoking doors, and the smoke-nozzle, are outside the building, while the back of the boiler, with the connexions, show inside, so that the whole of the pipes can be used for radiating purposes. Ordinarily, a certain amount of pipe has to exist between the boiler and the house, and which has to be carefully covered or it will cause a waste of heat. It will be noticed that the design of the boiler is such that, although some part of it is within the house, yet all attention, stoking, &c., is done outside.

From the back of the boiler are carried flow and return pipes having a slight rise towards the further extremity, where they terminate in an expansion box, as referred to in the last article. The pipes in a small apparatus like this would probably not exceed 3 in. diameter. The usual size for all medium and large-sized works is 4 in. This is an apparatus that is considered sufficiently simple for an amateur to erect himself, the pipe joints being made with indiarubber rings. (These will be spoken of later.) It can be just as easily carried round three sides of a house as along one side only, if the necessary quantity of pipe and bends are provided. No air-pipe would be needed if the expansion box is used and the pipes have a rise all the way. If more than two pipes be needed, the connexions can be effected, as will be shown presently.

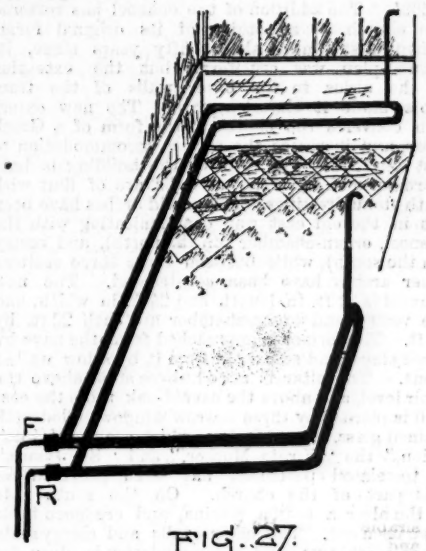


FIG. 27.

The next example, fig. 27, shows an apparatus to heat a small glass-house, the boiler situated outside the house somewhere; but we may assume it is not far away. It would also probably be somewhere below the house level. If this were a conservatory attached to a residence, the boiler might be in a cellar or basement-room near. In this case, the boiler would be of the independent kind, with the flow-pipe leaving the top (or the side, near the top) and the return entering at a low point, as fig. 28.

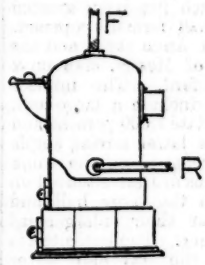


FIG.28.

FIG.29.

The difference, however, between these pipes in this case, and that last explained, is that they should not be of full size,—viz., 3 in. or 4 in., until they enter the place to be heated.

Between the boiler and the radiating pipes in an apparatus like this the pipes would not require to be larger than 1¼ in. Probably 1 in. would do, if the boiler was below, and the radiating pipes were not extensive, say not more than 40 ft. in all. This effects a saving in cost, and a deal of heat would be lost from these pipes, if large, and not carefully covered. Pipes which are not required for radiating purposes should always be covered with a poor heat conducting material, and, of course, it costs more to cover large pipes than small, and the large pipes answer no good purpose in a small apparatus like this.

The pipes now referred to, between boiler and radiating pipes, as they are small, would be of wrought iron, and in ordering the boiler, and also the cast pipe connexions, this must be remembered and prepared for, as otherwise no provision will be made for pipes that are to be screwed in. Both boiler and pipe makers will arrange for this if instructed. These pipes are run in the same manner as already described, that is, ascending everywhere.

The illustration shows the connecting pipes from the boiler entering the house at such a point that the radiating pipes have to branch off in different directions. Of course, if the connecting pipes can be brought in and connected to either extremity of the radiating pipes it would be better, but this example is given to show how branched services should be treated when needed.

There is nothing complex in connecting the branch services, especially in a small work like this. If a tee-piece be put at the angle where the connecting-pipes come, instead of the usual bend, a cap or socket drilled and tapped and fitted to the projecting end of the tee is all that is needed for the reception of the wrought-pipe. This practically leaves the two branches of the radiating pipes open for the water to circulate which way it chooses, as fig. 29. If the branches are of about equal lengths and working under the same conditions, the circulation may be expected to be fairly equal each way. If, however, as here shown, the branches are of unequal length, we may probably get unequal results, the shortest most likely "taking the lead," as it is termed, to the prejudice of the longer service, which will appear to be acting very sluggishly. In a larger apparatus any irregularity in the working of the different branches is controlled by stop-valves which have to be provided; but in this we can get sufficiently equal results by giving a little greater rise to the long branch than to the short one.

Air-tubes would have to be connected at each extremity as shown, these extending two or three feet above the level of the supply-cistern; ⅜ in.-tube would be quite large enough. The water-supply would be furnished by a small cistern placed in the most convenient position just above the level of the radiating-pipes. It is usually arranged for this cistern to be placed out of sight, behind rockery or plant staging. Of course, an expansion-box at each extremity would be very suitable, and dispense with the air-tubes, and supply-cistern, and provide the end supports, as already explained.

Sometimes it is desired to have three or four pipes on one side of the house, but only two on the other. The greater number of pipes would be upon the exposed side, the lesser number on the wall side, but this quantity is not usually required for greenhouses or conservatories, unless they are very wide or roomy. If three pipes are required, it is usually the flow that has the extra pipe, the return being single. The extra pipe is connected by a branch pipe, as

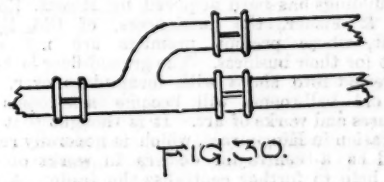


FIG.30.

fig. 30. If four pipes are needed, they are not placed one above the other, as three pipes very commonly are; they are generally placed two and two, and they then consist of two flows and two returns, the flows on top, the returns below.

In fixing the boiler of this example apparatus, it is to be supposed that if placed in a cellar or basement-room, it can be connected with one of the residence chimneys by a pipe. The size of this pipe will be governed by the size of the smoke nozzle on the boiler; the makers putting that size which is most suitable. If the apparatus is to be a permanent affair the smoke-pipe should be of cast-iron, and although coke may be the usual fuel it is best to provide soot-doors in all the elbows used. This gives access for sweeping should it ever be needed, or should access be required for any other purpose. Wrought-iron smoke-pipe answers very well in dry situations, and if the fire is not let out all the warm weather. If the conditions are different to this, it will soon fail even if it be galvanised.

To effect the proper working of the furnace, the pipe joints and the connexion of the smoke-pipe with the chimney should be air-tight, so that we may consider that all the air entering the chimney has to first pass through the fire. Most boilers will, however, work without such precautions as this; but if it is possible to fix the boiler in this air-tight manner, it is best to do so. In fitting up the flue-pipe a damper must be put close down by the boiler, where it can be conveniently used. The fire-doors of the boiler are usually provided with a sort of hit-and-miss ventilator to fulfil the purpose of a damper; but an additional damper in the flue-pipe should be provided, and it should be a well-fitting one, if the boiler is to be regulated with any degree of nicety.

It will have been noticed that the boiler shown is of the upright variety, which, like the "Loughborough," is capable of taking a charge of fuel to last through the night without attention. This is an essential feature if the greenhouse has anything else but hardy plants in it. If the conservatory is heated for the sake of the plants, the night is the time when the boiler should do its best. If, on the other hand, heat is only needed to make the conservatory com-

fortable for occupation during the day, the night cold is not so much thought of; of course, in this latter case, only evergreen shrubs, &c., would be placed in it.

OBITUARY.

MR. JOHN CHESSER.—The death is announced at Dorlin, Corstorphine, of Mr. John Chesser, architect, late Superintendent of Works to George Heriot's Trust. Born at Dalmeny, the deceased, on acquiring a knowledge of the joiner trade, crossed the Border, and while yet a young man held the post of master of works during the erection of some public buildings in Lincolnshire. On the death of his father he returned to Dalmeny, and succeeded him as Superintendent of Works on the estate of the late Earl of Rosebery. In 1858 Mr. Chesser was appointed Superintendent of Works to the Governors of Heriot's Hospital, in room of the late Mr. Alexander Black, and he continued to act in that capacity until about three years ago, when, on account of failing health, he resigned, and was granted a retiring allowance. During Mr. Chesser's term of office a large amount of Heriot Hospital ground had been feued, and in this connexion the late Superintendent of Works rendered valuable service, not only in connexion with the feuing of the land, but in preparing the ground and elevation plans. He also drew the plans for a number of the more recent Heriot Schools, the reorganisation of the Hospital School, and the reconstruction and extension of the Heriot-Watt College. The deceased, who is survived by a widow and grown-up family, was in his 73rd year.—*Scotsman.*

GENERAL BUILDING NEWS.

WILLIS'S ROOMS, ST. JAMES'S.—This historical building (originally "Almack's") is now in course of alteration, and before many weeks are over will have been completely changed. The block of buildings has been acquired by Messrs. Robinson & Fisher, the auctioneers, of Old Bond-street, whose present premises are not sufficient for their business. The ground-floor is being converted into shops with mezzanines over, and the old ball-rooms will become sale-rooms for pictures and works of art. It is thought that this alteration in King-street, which is generally recognised as a centre for dealers in works of art, will help to further centralise the trade. A considerable portion of the block, at the end nearest St. James's-street, is being altered to form suitable premises for a first-class restaurant or a dining-club. The front to King-street will be refaced, and will have a more architectural treatment than heretofore. The alterations, of which we hope shortly to illustrate the plans and elevations, are being carried out by Messrs. W. Johnson & Co., from the designs and under the direction of Messrs. J. T. Wimperis & Arber, architects.

RESTORATION OF BOURN ABBEY.—The ancient Abbey at Bourn is to be immediately restored. The work will be carried out in sections. Some months ago a committee was formed, having as its secretary Mr. R. M. Mills, who is a munificent subscriber to the cost. It is now announced that the response to the appeal made has been sufficient to justify the committee in giving instructions for the work to be immediately commenced.—*Leeds Mercury.*

NEW BANK, LEEDS.—A branch of the London and Midland bank was opened in Kirkgate a few years ago, and in 1890 designs were prepared by Mr. William Bakewell, architect, of Leeds, for a new bank, which was opened at the commencement of this year, on a site opposite the market. The façade is executed in stone from the quarries at Idle and Morley. The building is Classical in character, with Corinthian columns and pilasters. The pediment over the entrance is surmounted by a statue of "Midas," and the tympanum of the pediment is enriched with carving; the arms of London and Leeds are carved in the sunk panels on each pedestal. The interior of the banking room has a dado, 5 ft. high, executed in walnut; the walls above are lined with Italian marble. The floor of the bank is laid with mosaic pavement. The banking-room is warmed by hot-water coils; the fresh air is admitted and passed through the coils of hot-water pipes. The vitiated air is extracted by a shaft prepared for the purpose. The strong-rooms are placed in the basement; and a hydraulic elevator is provided for the service of the bank. The contractors for the work are Messrs. Nicholson & Son, Barrand Bros., Moore, Heavyside, Emley, De Grelle Houdret, Appleyard, Shroeder, Nutt. Paylor, Oldroyd, Churton, Barratt & Russell, Ratcliff & Horner, Chatwood, and Elgood. Mr. Charles Goulden has acted as clerk of the works.

NEW CHANCEL, PARISH CHURCH, EMSWORTH, HANTS.—On the 6th inst. the consecration took place of the new chancel just added to St. James's Parish Church, Emsworth. In November, 1890, the plans of Sir Arthur Blomfield, A.R.A., the Diocesan Architect, for the extension of the church at the east end, were approved, and on July 8 last the foundation-stone of the chancel was laid. The total cost of the work has been about 2,500*l.* The addition of the chancel has restored the church to something of its original form. When first built, about fifty years since, its ground-plan was cruciform, but the extension of the aisles to the outer walls of the transepts made it almost square. The new extension converts the church to the form of a Greek cross, and increases the sitting accommodation to just over 500. The style of the building is Late Norman, and the external walls are of flint with Bath stone dressings. Three bold arches have been cut in the old east wall communicating with the chancel, organ-chamber (on the north), and vestry (on the south), while between these three sections other arches have been constructed. The new chancel is 31 ft. in length and 25 ft. in width, and the vestry and organ-chamber are each 22 ft. by 17 ft. The former is approached from the nave by three steps, and separated from it by a low wall of stone. The altar is raised three steps above the choir level, and above the carved-oak table the east wall is pierced by three narrow windows filled with stained glass, the subjects of which are the "Crucifixion," the "Virgin Mother," and "St. James." A tesselated pavement has been provided in this part of the church. On the south side of the altar a sedilia, piscina, and credence table have been cut. The choir stalls and clergy seats are of pitch-pine, and accommodation is given for twenty-two choristers. Adjoining the northern pillar of the chancel arch is a pulpit, carved in alabaster, coloured marbles, and Bath stone. The body of the church has been repaved with wood blocks, and the old pews have given place to pitch-pine seats. The organ has been removed from the western end of the south aisle to the new organ-chamber, where room has been left for its extension. The windows have been filled with cathedral tinted glass, and the stained-glass window which formerly occupied the east end has been placed in another part of the church. A new heating system has been introduced.

TOWN HALL, CLECKHEATON.—On the 10th inst. Cleckheaton Town Hall, which has been erected in the centre of the town, was formally opened. The building is in the Queen Anne style, and has been built from the designs of Messrs. Mawson & Hudson, architects, of Bradford. The interior arrangements of the building include a large hall, which is planned to accommodate 1,000 persons and 100 more in the orchestra, the latter having ample retiring-rooms. The Board-room is on the same floor. The Local Board offices are all situated on the ground floor underneath the large hall, and provision has been made for their enlargement at any future time if necessary. The basement is devoted to workshops for the gas and water departments of the Board, kitchen, &c., from which there is a lift in connexion with the large hall, and the entire building is lighted by electricity. The principal features of the façade are a massive tower, rising to a height of nearly 100 ft., and capped by a turret, a projecting oriel window which lights the principal room in the suite allotted to the Local Board, and a gable at the south corner with bay windows. The contractors for the work were:—Masons, Messrs. Holdsworth Bros., Cleckheaton; joiner and carpenter, Mr. W. Isherwood; plumber, Mr. T. W. Cragg, Cleckheaton; plasterers, Messrs. Metcalfe & Lockwood, Staincliffe; ironfounder, Mr. Robert Hird; painter and decorator, Mr. Squire Nutter, Cleckheaton; slaters, Messrs. Albert Hill & Son; electric lighting, Messrs. J. H. Holmes & Co., Newcastle-on-Tyne.

PROPOSED RESTORATION OF ST. MARGARET'S CHURCH, WETTON.—It is proposed to restore the Church of St. Margaret, Wetton, Staffordshire, by the provision of new roof and ceiling, which are at present dilapidated and unsafe; new floor, the old being damp and rotten; the removal of an end gallery and partition, so opening up the Mediæval tower arch at present buried thereby; a new heating apparatus; the entire reseating of the church in lieu of the old deal pews; rebuilding of the organ; and making safe the interior of the tower, which contains bells of the dates 1699, 1703, and 1815. Plans have been submitted by Messrs. W. Sugden & Son, architects, Leek, and adopted.

CHURCH OF ST. ANNE, AMBERGATE, DERBYSHIRE.—The new Church of St. Anne, at Ambergate, was opened on the 13th inst. by the Bishop of Southwell. The structure will accommodate 250 worshippers, and there is a schoolroom below. Mr. A. Coke Hill, of Derby, was the architect, and Mr. J. Glossop, of Ambergate, the contractor. The church is in the Early English style, with nave, chancel, organ-chamber, choir vestry, and clergy vestry, with bell-turret. The roof is covered with red tiles, while the walls are of Ambergate stone, lined with red brick.

BISHOPTHORPE PALACE.—Alterations are being made at the Archbishop of York's Palace at Bishopthorpe. The old wooden floor in the chapel has been taken out, and a fireproof one substituted. Messrs. Mark Fawcett & Co. have been entrusted with the work. Mr. Ewan Christian is the architect.

FOREIGN AND COLONIAL.

FRANCE.—The Jury of Architecture of the Ecole des Beaux-Arts has given judgment on the competion opened for "Un Hôtel Général d'Association des Etudiants," awarding a medal to M. Lajoie, pupil of M. Laloux.——It is announced that the City of Paris is about to purchase, at the price of a million francs, the celebrated hôtel of the Archbishops of Sens, which will become a kind of dependency of the Carnavalet Museum.——The Louvre has acquired the original model executed by Rude for the bronze statue erected at Fixin (Côte d'Or) to the memory of Napoleon.——On April 21 a new art exhibition organised by the "Union Libérale des Artistes Français" is to be opened in the Palais des Arts Libéraux. It will remain open till June 20.——The fine collection of faïence of the late M. Maillet du Boulay, formerly curator of antiquities at Rouen, has been acquired for the Louvre.——The "Nord" Railway Company proposes to commence shortly the arrangements for penetrating further into Paris with auxiliary lines serving the Halles Centrales and the Paris Opéra.——A fire which might have had serious consequences broke out last Saturday at the Sèvres Manufactory. The collections escaped, however, and the injury was only to *matériel* of the value of 50,000f. or thereabouts.——The work of dismantling the fortifications of Arras has been stopped by a general strike of the workmen engaged.——An international exhibition is to be opened at Bordeaux during this year.——At Tours there is to be an exhibition in May, chiefly connected with public instruction, hygiene &c. It will be open till August.——An industrial and artistic exhibition is to be held at Cannes in the months of March and April, and at Reims there is to be an art exhibition in the autumn, opening October 1.——M. Gerôme, the painter, has just finished a bust of Philippe Rousseau, to be set up in the garden of the Museum at Evreux.——M. André, the architect, has been commissioned by the Municipality of Lyons to design the monument to be erected there to the memory of the lyric poet Dupont.——The Minister of Public Instruction has appointed M. Degré Professor of Architecture at the Ecole Nationale des Beaux-Arts at Dijon.——The jury of architecture of the Ecole des Beaux-Arts has awarded the Edmond Labarre prize to M. Bardey, pupil of M. Guadet.——M. Maggesi, Honorary Director of the School of Sculpture at Bordeaux, has just died in that city. He was born at Carrara in 1807, and exhibited in the *Salons* of 1838, 1841, 1845, and 1857, and settled at Bordeaux in 1862. Among his numerous works are the marble statues of Montaigne and Montesquieu in the Place des Quinconces at Bordeaux; and eight busts or statues in the Museum at Bordeaux, especially "Jupiter Olympius" and "Giotto." In the Cathedral of St. André is to be seen the fine tomb which he executed for Cardinal de Cheverus. He also executed some of the colossal statues placed on the Palais de Justice, and the fine bust of the architect Louis which decorates the foyer of the theatre at Bordeaux.——The Minister of Public Instruction has granted a credit of 40,000 francs for the restoration of the ancient theatre at Orange. M. Formigé is the architect entrusted with the work.

BERLIN.—The members of the Prussian Royal Academy had a special meeting to celebrate the Emperor's birthday. Herr Professor Otzen (Hon. Corresponding Member of the R.I.B.A.) was the orator for the day. In a lengthy harangue he treated of matters pertaining to the gradual development of church-building in Berlin. It may be noted that no less than twenty-five Protestant churches have been built or commenced within the city and suburbs of Berlin since the day on which Emperor William II. ascended the throne.——Anton von Werner will for the coming year 1892-3 again hold the president's chair in the "Verein Berliner Kuenstler." There was a close contest with a second candidate, Herr Karl Becker, President of the Prussian Royal Academy, who obtained 108 votes to Anton von Werner's 109. If Herr Becker had been elected the unpleasant relations between the Society and the Academy would probably have now seen an end, especially as the "Academy party" in the "Verein" is gradually but surely getting stronger.——During a business meeting of the "Verein Berliner Kuenstler" a large participation at the Chicago show was decided on. Berlin will be well represented as regards to quantity if not quality of work. Munich will send only a small collection of South German works of art, but it is to be a very select one.——The "Vereinigung Berliner Architekten" intends exhibiting at Chicago as a body, and will send a fairly representative collection of architectural work done in the city by its members. Each member of the Society has been invited to prepare drawings of work he has carried out during the last decade, special conditions as regards the scale of the drawings, and the different sizes of sheets, being added. The drawings are to become the property of the "Vereinigung," who will (on their return from the Chicago show) use them as a basis for a larger collection of members' work planned some time back. This latter collection of members' work, which will be kept up to date by the regular contributions of drawings of all the more important

buildings erected year after year, will some day be a valuable one for the historians of the future.——Herr Kayser, at a meeting of the "Vereinigung Berliner Architekten," reported on the progress made by the special committee of members of the society occupied with framing a new code of building regulations intended to replace the very unpopular one at present in force. When ready the different paragraphs of the new code are to be put before the authorities in the form of propositions, and it is hoped that they will be passed with but few alterations as early as 1893.——The proposal to erect a so-called "Provincial Museum" in Berlin, which has been before the municipal authorities for some time, has found favour. The financial part of the question has been solved, and a site for the new museum selected in the city proper. A competition for a suitable design for the building (which is to cover some 2,000 square mètres of ground) is to be opened at once; three premiums (125*l.*, 75*l.*, and 50*l.*) are to be awarded.——The two Court playhouses, the opera-house and the theatre, will be subjected to some extensive alterations in accordance with the requirements of the Prussian police regulations relating to the protection of human life in theatres. In the budget put before the Prussian Parliament a vote of 25,000*l.* is asked for this purpose, and will have to be granted, as the houses would otherwise have to be closed. The regulations require the alterations to be complete by October, 1893.——The large building of the Imperial Bank of Germany (the "Reichsbank"), generally considered to be one of the finest in the city, is to be extended. The foundations for a new wing are to be taken in hand at once, and the new rooms are to be occupied in 1894.——At the "Kunstgewerbe Museum" a special exhibition of Japanese work has been opened for a charitable purpose (relief works in Japan). Some sixty private collectors, among them a number of the members of the Royal Family, headed by the Emperor, have lent objects of interest.——Messrs. Hennicke & v. d. Hude, a firm of architects of old standing and repute, have dissolved partnership. Among the work done by the firm we note the Lessing Theatre and Central Hotel, both in Berlin.——An exceedingly popular member of the profession, Herr Giesenberg, the manager and junior partner of Messrs. Ende & Boeckmann, died last month after a tedious illness of some duration. He had been senior assistant to the late Professor Lucae at the time of the erection of the Frankfort Opera House, and had, after the death of his chief,—which occurred during the time of the erection,—the completion and entire interior decoration of this building in his hands. In 1884 he was one of the four winners classed equal in the great competition for the so-called "Museum Island" design.

MISCELLANEOUS.

NATIONAL REGISTRATION OF PLUMBERS.—A meeting of the local district council was held at the Guildhall (by kind permission of the Mayor) on the 8th inst., under the presidency of Mr. T. J. Pope, architect. There was a good attendance of representatives, and the following, amongst other resolutions, was adopted:—"That this council, recognising the close connexion between the public health and the plumber, and thus the necessity in the public interest for members of the craft of plumbing to be properly acquainted with the laws of sanitation, expresses its warm approval of the efforts being made by the Worshipful Company of Plumbers to obtain the sanction of Parliament to a Bill for the registration of plumbers and for the efficient examination of all entering the trade, and desires that local members of Parliament be requested to support the same." It was also resolved to form a local committee, composed of five members and a secretary, the public and master operative plumbers being equally represented, at Bath, Cheltenham, and Gloucester.

ROYAL METEOROLOGICAL SOCIETY.—The usual monthly meeting of this Society was held on Wednesday evening last, at the Institution of Civil Engineers, 25, Great George-street, Westminster, Dr. C. Theodore Williams, President, in the chair. Four papers were read, the first one being on "The Untenability of an Atmospheric Hypothesis of Epidemics," by the Hon. Rollo Russell, M.A., F.R.Met.Soc. The author is of opinion that no kind of epidemic or plague is conveyed by the general atmosphere, but that all epidemics are caused by human conditions and communications capable of control. In this paper he investigates the manner of the propagation of influenza, and gives the dates of the outbreaks in 1890 at a large number of islands and other places in various parts of the world. Mr. Russell says that there is no definite or known atmospheric quality or movement on which the hypothesis of atmospheric conveyance can rest, and when closely approached it is found to be no more available than a phantom. Neither lower nor upper currents have ever taken a year to cross Europe from east to west, or adjusted their progress to the varying rate of human intercourse. Like other maladies of high infective capacity, influenza has spread most easily, other things being equal, in cold, calm weather, when ventilation in houses and railway-cars is at a minimum, and when perhaps the breathing organs are most open to attack. But large and rapid communications seem to be of much more importance than mere climatic conditions. Across frozen and snow-covered countries and tropical regions it is conveyed at a speed corresponding, not with the movements of the atmosphere, but with the movements of population and merchandise. Its indifference to soil and air, apart from human habits depending on these, seems to eliminate all considerations of outside natural surroundings, and to leave only personal infectiveness, with all which this implies of subtle transmission, to account for its propagation. In the second paper, on "The Origin of Influenza Epidemics," by Mr. H. Harries, F.R.Met.Soc., another theory was propounded. The author has made an investigation into the facts connected with the great eruption of Krakatoa in 1883, and the atmospheric phenomena which were the direct outcome of that catastrophe. He has come to the conclusion that the dust derived from the interior of the earth may be considered the principal factor concerned in the propagation of the recent influenza epidemics, and that, as this volcanic dust invaded the lower levels of the atmosphere, so a peculiar form of sickness assailed man and beast. The third paper was a "Report on the Phenological Observations for 1891," by Mr. E. Mawley, F.R.Met.Soc.; and the fourth a "Note on a Lightning Discharge at Thornbury, Gloucestershire, on July 22, 1891," by Dr. E. H. Cook.

"L'AIR FROID" SYSTEM.—We have received a description and illustrations of what is called "L'Air Froid System of Ventilation," the main object of which is to prevent the condensation of moisture on the internal surface of shop-windows, by which they are often obscured. The device consists simply of fresh-air inlets arranged below the window and foul-air outlets above it, and would doubtless achieve the end principally aimed at by the author, Mr. G. C. Vernon Inkpen. The system, as a means of ventilation, would have but small effect, as the action would be confined almost entirely to the portion of the shop atmosphere immediately contiguous to the window. A patent has been granted for this invention, but, as in England, such a grant is no evidence of validity, we do not hesitate to express our doubt as to the invention possessing sufficient novelty to maintain the patent.

AUTOMATIC "IN-AND-OUT" TURNSTILE.—Mr. G. Williamson, the patentee of this turnstile, which we noticed briefly last week, sends us a sketch diagram of the mechanism, from which we see that we misunderstood the description formerly sent, and did not do justice to the ingenuity and usefulness of the turnstile. The ingress and egress are through the same opening, the space occupied by the opposite arm being permanently blocked in the usual manner for egress turnstiles, the motion being capable of reversal for ingress on the insertion of the coin. The method by which the turnstile sets itself, after the insertion of the coin has allowed it to pass a quarter revolution, is ingenious and simple, the only weak point being the dependence on the action of a spring, which is always an undesirable element in mechanism, though it cannot always be dispensed with.

LIVERPOOL ENGINEERING SOCIETY.—The eighth ordinary meeting of this Society for the present session was held on February 10, at the Royal Institution. Mr. Thomas Morris, F.G.S., read a paper entitled "Engineers' Tests for Iron considered, and Suggestions for Standard uniform Tests." The author showed by tables of numerous engineers' tests how engineers would ask for different tensile strains for the same class of work, adding that the iron must be equal to some known "brand," as though the iron produced in the localities named was uniform in quality. He paid a high tribute to the reduction of area test, as being one that gave more consolation to the engineer in case of work coming to grief than any other test specified. The elongation test, which he said was only another form of test for ductility, was not to be depended upon with the same ease and comfort as contraction of area, and the manner in which the former test was specified by nearly all engineers was anything but creditable. He treated the "limit of elasticity test" with disfavour almost amounting to ridicule. His suggestions for "standard uniform tests and conditions" were put in the simplest form, and were thoroughly explained to those present. The discussion was adjourned to the next meeting.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—At the meeting of this Society on Wednesday evening last, a paper on "Gas Producers" was read by Mr. R. Booth, M.I.M.E. The author first of all dealt with the increased attention which has lately been given to the economical use of fuel, and the possibilities which lay ready to hand for avoiding smoke and mitigating the fog nuisance by means of the use of gaseous fuel. He pointed out that it had been satisfactorily proved that the discharge of black smoke from factory chimneys could be entirely obviated by using gas instead of solid fuel, but the application of gas to domestic purposes did not come within the scope of his paper. He then proceeded to compare the chemical and physical problems presented by the two systems of burning coal from a broad point of view, pointing out that the process of combustion was by no means a simple one,—that while, considered as a process of oxidation, the amount of heat was invariable, the intensity varied with the rate at which the oxidation took place.

A PERFECT SCREW.—What is claimed to be a perfect screw has recently been made by Professor Rowlands, of the Johns Hopkins University, in the United States. This screw forms part of a dividing machine of wonderful accuracy which the Professor has devised. It is 17 in. long, 1¼ in. in diameter, and has twenty threads to the inch. It is described as being made of "Jessop tool steel," from which we gather that the material has been sent from Sheffield. It was cut in a lathe and then ground with fine emery for three weeks in oil and water kept at a constant temperature. The dividing machine will rule 100,000 lines to the inch on highly polished speculum metal; and it is said a 1,000,000 lines to the inch can be ruled if required; 110,000 lines to the inch have been done. The cutting part is a diamond.

THE ENGLISH IRON TRADE.—The English iron market remains in a quiescent state. There is still great want of animation on the Scotch warrant market, and in the Cleveland district there is a lessened demand for crude material. The hematite pig-iron trade is still depressed. Manufactured iron is in limited inquiry, and Welsh bars are slightly lower than last week. The tin-plate market remains dull. In steel there is an increased call for heavy sections, which have again been advanced, but other descriptions exhibit little alteration. Shipbuilding is tolerably active, except on the north-east coast. Engineers are only moderately employed; the strike on the Tyne still shows no signs of termination. The coal trade is quiet.—*Iron.*

THE BROOKLYN BRIDGE has long been insufficient for the traffic between Manhattan and Long Island, and a Bill is now being brought forward in the New York State Legislature by which the East River Bridge Company and the Union Elevated Railway Company seek power to build two bridges across the strait which is called by New Yorkers the East River. Twenty-five million dollars is the capital set apart for the undertaking.

LEGAL.

CASE UNDER METROPOLIS MANAGEMENT ACT, 1878.

HOUSE FRONTING MORE THAN ONE STREET: CROWN LANDS.

MR. JAMES POLLOCK, builder, Mottingham, was summoned at the Woolwich Police-court, on the 5th instant, by the London County Council, for not setting back the external fence of the forecourt or other space in front of a house on the east side of a footway leading from Chislehurst Park to Lee.

Mr. Chilvers, from the Solicitor's department, supported the summons, and called a surveyor, who proved the erection of the fence at less than the prescribed distance from the centre of the footway.

The witness on cross-examination admitted the house fronted Chislehurst Park, and only had a flank wall abutting on the footway.

Mr. Sampson, solicitor for the defence, submitted that sections 6 and 8 of the above-named Act applied only to the forecourt or other space in front of a house, and not to a piece of land at the side; and, further, that as the land on which the fence was erected was Crown property, the Council could not proceed without the consent of her Majesty's Commissioners of Woods and Forests, as provided by section 27 of the Act.

Mr. Chilvers contended that that section did not apply to a Crown lessee, and that the summons was in respect of the fence and not the land; also that in the lease held by defendant it was provided that the powers of the late Metropolitan Board of Works should be complied with.

The magistrate, Mr. Marsham, held that a house could front three or four roads, and that a Crown lessee was not exempt; and he ordered the fence to be set back in a month, and allowed 2*l.* 2s. for costs; but, on application, he granted a special case.

MEETINGS.

SATURDAY, FEBRUARY 20.

Architectural Association.—Visit to the Imperial Institute, South Kensington, by permission of the architect, Mr. T. E. Collcutt. 3 p.m.

MONDAY, FEBRUARY 22.

Royal Institute of British Architects.—Messrs. R. Herbert Carpenter, F.S.A., James Powell, N. H. J. Westlake, F.S.A., and Clement Heaton on "Painted and Stained Glass." 8 p.m.

Royal Academy of Arts.—Dr. A. S. Murray on "Archaic Compared with Archaistic Sculpture." III. 8 p.m.

Liverpool Architectural Society.—Mr. James Dod on "Light and Air."

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
Intermediate School, Bridgend	Committee	10*l.* 10*s.*	Mar. 9
Two Swimming Baths, &c. Frederick-st...	Rotherham T. C.	Not stated	Mar. 16
*Laying-out Public Park	Corp. of Newport, Mon.	52*l.* 10*s.* and 21*l.*	Mar. 25
*Construction of Bridge over Canal	Corp. of Bootle	105*l.* and 52*l.* 10*s.*	June 1

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor or Engineer.	Tenders to be delivered.
*Roadmaking and Paving Works	Willesden Loc. Bd.	O. Clau'e Robson	Feb. 23
Flint Road Metal	Southampton Corp.	W. B. G. Bennett	do.
Mission Church, Calder Grove, near Wakefield	.....	W. S. Barber	do.
Junior Schools, Caretaker's House, Willington Quay	Wallsend School Board	Wm. Hope	do.
Drainage, Workhouse, Ponteland, Newcastle-on-Tyne	Castle Ward Union	W. Lister Newcombe	do.
Stables and Depot at Horfield	Bristol Tramway and Carriage Co. Lim...	*Official*	do.
*Removal of House Refuse, &c.	St. Pancras Vestry	do.	do.
Supply of Timber	G. W. R. Co.	do.	Feb. 24
Jetty Extension, &c.	Stonehouse Pool Impt. Comrs.	.....	do.
Cast-iron Water Mains, Treval, near Torpoint	St. Germans U.R.S.A.	S. P. Hosking	do.
Drainage Works	Newcastle-u-Lyme T.C	Jas. Pattison	do.
Station Buildings and Goods' Yard, Rishton	Lancs. & Yorks. Ry...	*Official*	Feb. 25
*Supply of Gas Fittings	Vestry of St. Mary, Islington	do.	do.
*Iron Staircase at Workhouse	Birmingham Guardns	do.	do.
*Repairs at Workhouse, Borough	St. Saviour's Union	Jarvis & Son	do.
Wood Paving	Gateshead Impt. Com.	J. Bower	do.
Cast-iron Pipes (400 tons)	Thurlstone (near Shefield) Local Board..	G. & G. H. Crowther	do.
New Schools, Still House-lane, Bedminster	Bristol School Board..	W. V. Gough	Feb. 26
*New Parochial Offices	Battersea Vestry	E. W. Mountford	do.
Schools and Appurtenances at Methodist Church, Blackhill, co. Durham	Rev. J. Elliott	Joseph Shields	Feb. 27
*Works and Materials	Mortlake Dist. Highway Board	H. Richards	Feb. 29
*Works and Repairs to Foot and Carriageways	Limehouse B. of W.	*Official*	do.
*Public Baths	Borough of Shrewsbury	do.	do.
*Purchase and Pulling-down Building Materials	School Bd. for London	do.	do.
Street Work	Chertsey R.S.A.	do.	do.
*Wood Paving Blocks	Paddington Vestry	do.	do.
*Thames Ballast, Sand, and Cement	do.	do.	do.
Thirteen Houses, Theresa-street, Blaydon-on-Tyne	Blaydon Co-op. Soc.	do.	do.
*Works and Materials	Hendon Local Board..	S. S. Grimley	do.
Re-building Church, Chacewater	.....	R. Sedding	do.
*Supplying and Laying Victoria Stone and Kerbing	Farnham Local Board	R. F. Hankins	do.
Thirteen Houses and Completion of thirty-three others, The Graig, Pontypridd	.....	T. R. Phillips	Mar. 1
Granite Road Metal, &c.	Lower Strafforth and Tickhill High. Bd...	*Official*	do.
*Works and Materials	Lewisham Bd. of Wks.	do.	do.
Landing Stage, Promenade Pier, Teignmouth, Devon	Devon Steamship Co.	J. C. Inglis	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Road-metal, Flagging, Kerbs, &c.	Plymouth Corp.	G. D. Bellamy	Mar. 1
Road Works	Wigton Highway Bd.	J. Sibson	do.
*Pipe Sewers, &c.	Southend Loc. Bd.	P. Dodd	do.
New Schools, Ogmore Valley, near Bridgend	Llangeinor Sch. Bd.	G. F. Lambert	Mar. 2
Private Street Improvement Works	Halifax Corp.	E. R. S. Escott	do.
Six Through Dwelling-houses, Halifax	.....	C. F. L. Horsfall & Son	do.
*Pipe Sewer, &c.	Fulham Vestry	J. P. Norrington	do.
*Making-up and Paving Roads	do.	W. Sykes	do.
50,000 Paving Bricks	Bognor Loc Bd.	*Official*	Mar. 3
*Circular Gasholder-tank	Rugby Gas Co.	do.	Mar. 4
*Oak Fencing	Southgate Local Board	C. G. Lawson	do.
*Maintenance and Repairs to Roads	Kent County Council	*Official*	Mar. 5
Oblique Bridge, Blackpool-gate, Bewcastle	Longtown (Cumberland Highway Bd.	R. Maxwell	do.
Concrete and Brick Gasholder Tank (No. 2)	Sheffield Gas Co.	F. W. Stevenson	do.
Wrought-iron Roof, Kirkgate Market	Leeds Corp.	T. Hewson	do.
*Works and Materials	St. Giles B. of W.	*Official*	Mar. 7
*Making-up Roads	Rotherhithe Vestry	do.	Mar. 8
*Wrought-iron Fencing	Boro' of West Ham	do.	do.
*Completing Stores, Dwelling-house, &c.	.....	C. Dunch	do.
*Works and Materials	Battersea Vestry	J. T. Pilditch	do.
*Supplies, Collection of House Refuse, &c.	West Ham Council	Lewis Angell	do.
*Asphalte Works	Edmonton Loc. Bd.	*Official*	do.
*Works and Materials	Sheffield Town Coun.	C. F. Wike	Mar. 9
*Making-up Roads	Hornsey Loc. Bd.	T. de Courcy Meade	Mar. 11
*Sewerage Works	do.	do.	do.
*Two Cottages	do.	do.	do.
*Works and Materials	do.	do.	do.
*Iron Fencing, with Gates	do.	do.	do.
Extension of Schools, Tylorstown, and other work	Ystradyfodwg Sch. Bd.	J. Rees	Mar. 12
*Sewerage Works	Corp. of Durban, Natal	W. H. Radford	Mar. 15
*Road Materials and Tools	Bedfordshire C. C.	*Official*	Mar. 17
*Church, Millbrook, Cornwall	.....	G. H. Fellowes Prynne	No date
*Supply of School Furniture	Smethwick Sch. Bd.	*Official*	do.
Doctor's House, Morpeth	Ashington Med. Soc.	W. J. Charlton	do.
Convalescent Home, Hexham	.....	Johnson & Hick	do.
New Buildings, Harrogate	Harlow Manor Hydropathic Co. Lim.	H. A. Cheers	do.
Two Cottages, Wilbrighton, Newport, Salop	Sir T. F. Boughey	W. R. Wedge	do.
Girls' School, Castle Eden Colliery, near Newcastle-on-Tyne	Rev. J. Burdon	.....	do.
Road Work, near Cadoxton, Cardiff	S. Rooney	.....	do.
House and Workshop, Stamford-street, Leeds	W. Watson	.....	do.
Eight Houses, Dolly-lane, Leeds	.....	C. F. Wilkinson	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Assistant Surveyor	Kettering L. B.	100*l.*	Feb. 23
*Clerk of Works	Hornsey Sch. Bd.	3*l.* 3*s.*	do.
*Extra Assistant City Engineer	Cape Town Corp.	275*l.*	Feb. 24
*Clerk of Works	Canterbury U.S.A.	.....	Feb. 27
*Inspector of Nuisances	Brentford Loc. Bd.	100*l.*	Feb. 29
*Second Assistant Surveyor	Croydon County Boro'	100*l.*	Mar. 1
*Sanitary Inspector	Hanley County Boro'	104*l.*	Mar. 8

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., viii., ix. & xxiii. *Public Appointments, p.* xx.

TUESDAY, FEBRUARY 23.

Institution of Civil Engineers.—(1) Mr. W. T. Douglass on "The Bishop Rock Lighthouses." (2) Mr. David C. Salmond on "The Illumination by Gas of Tory Island Lighthouse, Co. Donegal." 8 p.m. The meeting will be adjourned at 9 p.m., when the President and Council will hold a reception in the libraries.

Society of Arts (Applied Art Section).—Mr. J. William Tonks on "Artistic Treatment of Jewellery: Jewel and Address Caskets." 8 p.m.

Builders' Clerks' Benevolent Institution.—Twenty-fifth Annual General Meeting of Donors and Subscribers. 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. Wright Clarke on "Details of Plumbers' Work." 8 p.m.

WEDNESDAY, FEBRUARY 24.

Carpenters' Hall, London Wall.—Professor A. Wynter Blyth on "Sanitary Appliances." 8 p.m. (*Admission free.*)

British Museum.—Miss Eugénie Sellers on "Greek Sculpture: Sculptures from Bassae." III. 2.30 p.m.

Society of Arts.—Mr. Ernest Hart on "Ancient and Modern Art Pottery of Japan." 8 p.m.

Liverpool Engineering Society.—Adjourned Discussion on Mr. Thomas Morris's paper on "Engineers' Tests for Iron considered, and Suggestions for Standard Uniform Tests." 8 p.m.

THURSDAY, FEBRUARY 25.

Society of Antiquaries.—8.30 p.m.

Institution of Electrical Engineers.—8 p.m.

FRIDAY, FEBRUARY 26.

Royal Academy of Arts.—Professor J. H. Middleton on "Michael Angelo" I. 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr G. H. Sheffield on "The Construction and Efficiency of Locomotive Boilers." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. Charles Jones on "Scavenging, Disposal of Refuse." 8 p.m.

Institute of Certified Carpenters.—7.30 p.m.

SATURDAY, FEBRUARY 27.

Builders' Foremen and Clerks of Works Institution.—Annual Dinner, Holborn Restaurant. 6 p.m.

Edinburgh Architectural Association.—Visit to St. Nicholas Church, Dalkeith and to Newbattle Abbey.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

3,797.—CEMENT: *G. H. Skelsey.*—This patent refers to a process of manufacturing Portland cement from chalk to be found in large quantities near Hull and other places. An ordinary wash-mill in combination with an edge-runner mill, made with specially-constructed heavy runners, is employed. The chalk is weighed into the required quantities before it is passed to the edge-runner mill, where it is mixed with a proportion of water and ground into a thin paste of the required gravity, and then is passed to a wash-mill, in which it is mixed with a certain proportion of clay. The manufacture is then proceeded with in the ordinary manner. The inventor claims that cement made in this way can be produced at much less than the usual cost.

3,877.—WINDOW VENTILATION: *C. R. Green.*—This patent refers to an improved method of window ventilation effected by means of a series of holes bored in the sash-frame where the top sash shuts against it when closed. Further arrangements for carrying out the invention are fully described in the specification.

3,908.—FIREPLACES: *J. W. Lewis.*—This invention relates to the construction and arrangement of the back parts of domestic fireplaces so that the fireclay or like back block may be made separately from, and if desired much thicker than, the baffle block. Means are described for connecting the same together and to the firebox.

4,424.—VENTILATORS: *A. W. Kershaw.*—The inventor claims that an improved ventilator for the admission of fresh air is made by combining two forms of inlet ventilation, the one part after the form of the Sheringham or box inlet, and the other part the application to the same of the inventor's patent diffusers. The said inlet ventilator consists of a frame for building or fixing in wall, of a face-plate with sides hinged at foot, or sliding in and out of frame, for opening and closing, and of the above patent diffusers.

14,576.—GLAZING BARS: *J. Jeffreys.*—This refers to an improvement in glazing bars for fixing glass on roofs, &c., to form a water-tight covering, and consists of the combination of two separate bars to form a channelled sash bar, the insertion of an elastic packing between the two bars to equalise the pressure, and an arrangement for securing an even line when seen from below.

18,757.—FIREPLACES: *A. C. Freemant.*—This specification relates to what is described as an improved method of inducing and increasing up-draught and preventing down-draught in fireplaces. This is effected by providing a front cover or screen of sheet-metal (iron-plate) as described. Above the same is a bar or rod which may be elongated by a screwed socket-fitting or by a slide arrangement for the purpose of adjusting the height between the screen itself and the mantelpiece, to which a screw clamp or like fitting may be applied in connexion with the adjustable rod.

NEW APPLICATIONS FOR LETTERS PATENTS.

February 1.—1,929, H. Stewart, Ventilating Sewers, &c., and Disinfecting or Deodorising the Gases therefrom.—1,942, S. Renschel, Fastening Devices for Handles of Furniture, &c.—1,945, A. Smith and J. Emery, Centre Revolving Ball in Taps.

February 2.—1,961, W. Dransfield, Water and Gas Pipe Hooks.—1,966, R. Hunter and J. Turnbull, Cooking Ranges.—1,973, J. Shubrook and W. Belemore, Fire-grates or Stoves.—2,003, R. Esplin, Hinges.—2,009, J. Brook, Chimney-cowls.—2,011, K. Dieterich, Wainscoting.—2,018, W. Day and E. Eden, Safety Ladder Hook.—2,033, C. Baker and Others, Composition Material forming Boards, Slabs, Linings, &c., in Substitution for Wood, &c.—2,047, J. Price, jun., Pipe-joints.

February 3.—2,085, A. Bremner, Wood Screws.—2,083, H. Penn, Socket-bolts for Doors, &c.—2,091, W. Blackband and H. Charles, Door-nobs, &c.—2,094, J. Bolding, Automatic or Self-acting Valve and Index, constructed in such a manner as to cause the siphon of a flushing-tank or cistern to discharge its contents, and simultaneously to register such discharge.—2,116, J. Harrison, Sash-fasteners.

February 4.—2,131, F. Stokes, Continuous treatment of cement, &c., and in the lining of kilns and furnaces for burning materials of a basic character.—2,123, C. Kaye and J. Whitehead, Increasing and regulating the draught in ordinary Fireplaces.—2,134, C. Horton, Water-closets.—2,137, C. Crompton and G. Taylor, Window-catch.—2,161, A. Kershaw, Ventilators.—2,201, R. Clark, Varnish.

February 5.—2,224, G. Spencer, Window Sash-fastener.—2,232, G. Haskins, Spring Hinges for automatically returning movable parts of structural detail to normal position.—2,239, G. Cartwright, Plane Iron-fastener.—2,248, E. Weber, Hardening Tools.—2,259, T. White, Burning of Bricks and Cements.—2,291, F. Martin, Door Furniture.

February 6.—2,322, S. Cooper, Hoists or Elevators.—2,325, W. Pitt, Folding-gates.—2,333, F. Kress, Devices for holding centres in making masonry vaults.—2,344, R. Batey, Door-locks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

20,332, A. Spaulding, Flexible Doors.—21,974, F. Hart, Measuring and proportionally describing graphically Sections of Tunnels, Arches, and Bridges; also Openings generally of limited height and width.—22,141, E. and C. Howl, Brick-kilns, &c.—22,336, A. Rowan, Cleansing Paint Brushes.—22 424, G. Goldsmith and J. Stephen, preventing Down Draughts in Chimneys.—22,754, W. Hoyte, Lock Nuts.—23, F. Collins, Bolts for Emergency Exit Doors, &c.—25, A. Milne, Bolts for Emergency Exit Doors, &c.—187, G. Skinner and J. Hill, attaching Door-knobs or Handles to their Spindles.—432, A. Ford, Bolts for Windows, &c.—530 J. Wilkinson, Down Draughts in Chimneys.—608, R. Spring, preventing Waste of Water in or from Cisterns.—663, L. Dove, Automatic Disinfecting Apparatus for attaching to Flushing Cisterns, &c.—732, C. Griffiths, Stoves.—762, S. Bearder, Stops for Joiners' and like Benches.—804, W. Byers, Sliding Bolts for securing Doors, Windows, &c. 805, F. Smythies, Sash-fasteners.—814, J. Faulds, Masons' Tools.—827, W. Orr, Metallic Girders.—869, G. Dunell, construction of Metallic Flooring or Docking for Bridges, Viaducts, or Buildings.—1,024, J. Evans, utilising Waste Heat for Heating Buildings.—1,195, A. Willard, Artificial Stone.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

1,959, H. Lake, Fire-grates.—2,382, G. Scollay, Paint or Paint-stocks.—2,819, J. Nicholls, Window-sash

Holder.—5,772, C. Huelser, Clay Presses, for making tiles, &c.—12,760, J. Pullan and others, Brick-pressing Machines.—17,891, A. Emery, Automatic Locking Sash-fastener.—19,910, C. Knapp, Automatic Sash-lift and Lock.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

FEBRUARY 4.—By *Worsfold & Hayward*: "Holly Lodge," near Dover, f., 570*l.*; a plot of freehold land, St. Margaret's Bay, 125*l.*

FEBRUARY 9.—By *Thurgood & Martin*: F.g.r. of 13*l.*, Lordship-villas, Wood-green, with reversion in 71 yrs., 260*l.*; f.g.r. of 18*l.*, with reversion in 71 yrs., Acacia-villas, 360*l.*; f.g.r. of 16*l.*, with reversion in 71 yrs., William-ter., 320*l.*; f.g.r. of 143*l.*, with reversion in 83 yrs., Alfred-ter., &c., 2,892*l.*; f.g.r. of 173*l.* 5s., with reversion in 71 yrs., Harriet-villas, &c., 3,577*l.*; f.g.r. of 9*l.*, with reversion in 72 yrs., Clifton-ter., &c., 180*l.*; f.g.r. of 21*l.*, with reversion in 73 yrs., Clifton-ter., 445*l.*—By *C. P. Whiteley*: 26, Ingersoll-rd., Shepherd's-bush, u.t. 89 yrs., g.r. 6*l.* 6s., 320*l.*

FEBRUARY 10.—By *A. Richards*: F.g.r. of 45*l.*, with reversion in 76 yrs., Crown-st., Camberwell, 900*l.*; f.g.r. of 40*l.*, with reversion in 76 yrs., Millgrove-st, Battersea, 880*l.*; f.g.r. of 12*l.*, with reversion in 75 yrs., Chatham-st., 250*l.*; f.g.r. of 30*l.*, with reversion in 76 yrs., Blucher-st., Walworth, 560*l.*—By *A. & A. Field*: 30 and 34, Spital-st., Mile-end, f., r. 83*l.* 4s., 810*l.*; 28 and 29, Dorset-st., Spitalfields, u.t. 27 yrs., 100*l.*—By *A. Barton*: 5 and 6, Fassett-sq., Dalston, u.t. 60 yrs., g.r. 10*l.*, r. 63*l.*, 625*l.*—By *D. L. Gooch*: F.g.r. of 15*l.* 10s., Upper Cheyne-row, Chelsea, 365*l.*; f.g.r. of 28*l.* 1s., with reversion in 98 yrs., Holland-villas, Lewisham, 665*l.*; f.g.r. of 27*l.* 10s., with reversion in 98 yrs., Pk. View-villas, 635*l.*

FEBRUARY 11.—By *C. C. & T. Moore*: 89 to 95 odd, Cable-st., St. George's-in-East, f., r. 72*l.*, 1,000*l.*; 30 and 32, Grove-st., Commercial-rd., E., u.t. 9 yrs., g r. 6*l.*, 75*l.*—By *Newbon & Co.*: 40 and 41, Poet's-rd., Canonbury, u.t. 57 yrs., g.r. 14*l.*, r. 102*l.*, 865*l.*; 41, St. Paul's-rd., Camden-rd., u.t. 58 yrs., g.r. 7*l.*, 420*l.*; 10, Kenmure-rd., Hackney, u.t. 84 yrs., g.r. 6*l.* 10s., r. 36*l.*, 225*l.*; 54, Buckland-st., Hoxton, u.t. 43 yrs., g.r. 5*l.*, r. 36*l.*, 350*l.*; 86 and 88, Marlborough-rd., Holloway, u.t. 85 yrs., g.r. 12*l.* 12s., r. 58*l.*, 510*l.*—By *W. & F. Houghton*: 61, Down's-rd., Clapton, f., 1,500*l.*; 64, Grosvenor-pk.-rd., Walthamstow, f., 300*l.*; freehold residence, Church-hill, 1,100*l.*; a plot of freehold land, 105*l.*—By *Stimson & Sons*: 38, Spa-rd., Bermondsey, r. 24*l.* 14s.; and l.g.r. of 42*l.*, u.t. 24 yrs., 300*l.*; 127 to 133 odd, Spa-rd., u.t. 26 yrs., g.r. 15*l.* 4s., r. 135*l.*, 510*l.*; 24, Frean-st., u.t. 22 yrs., no g.r., r. 26*l.*, 105*l.*; 40 and 41, Frean-st., u.t. 23 yrs., g.r. 5*l.* 5s., 220*l.*; 53 and 54, Frean-st., u.t. 24 yrs., g.r. 6*l.*, 210*l.*; 7, Willow-walk, u.t. 24 yrs., g.r. 4*l.*, 205*l.*; 243 and 245, Fort-rd., u.t. 44 yrs., g.r. 9*l.*, 390*l.*; 18, Beatrice-rd., u.t. 43 yrs., g.r. 5*l.*, 200*l.*; 49 to 59 odd, Beatrice-rd., u.t. 41 yrs., g.r. 21*l.*, 1,440*l.*; 50 and 52, Anchor-st., u.t. 46 yrs., g.r. 6*l.*, 390*l.*; 317, Lynton-rd., u.t. 46 yrs., g.r. 3*l.*, 220*l.*; 171 and 177, Weston-st., u.t. 13 yrs., g.r. 7*l.* 10s., 105*l.*; 191, Weston-st., u.t. 17 yrs., g.r. 2*l.* 15s., 38*l.*; 20, Kinglake-st., Old Kent-rd., u.t. 15 yrs., g.r. 8*l.*, 65*l.*; 1 to 7 odd, Bagshot-st., u.t. 15 yrs., g.r. 9*l.* 5s., 255*l.*; 27, Mina-rd., u.t. 19 yrs., g.r. 3*l.* 16s., 130*l.*; 105 and 107, Coburg-rd., u.t. 15 yrs., g.r. 9*l.* 2s., 225*l.*; 219 to 229 odd, St. George's-rd., Peckham, u.t. 69 yrs., g.r. 17*l.* 10s., 1,250*l.*; 57, Cator-st., u.t. 70 yrs., g r. 4*l.* 4s., 130*l.*; 71, 73, and 75, Cator-st., u.t. 70 yrs., g.r. 12*l.*, 370*l.*; 76, Clayton-rd., u.t. 82 yrs., g.r. 5*l.*, 275*l.*; 102 to 106, New Church-st., Bermondsey, u.t. 6 yrs., g.r. 8*l.*, 245*l.*; "The Chestnuts," Grove-hill, Dulwich, f., 1,200*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/8	0/0/0
Teak, E.I. load	9/10/0	15/0/0
Sequoia, U.S. ft.cu.	2/3	3/0
Ash, Canada load	2/10/0	4/0/0
Birch, do.	3/5/0	4/10/0
Elm, do.	3/10/0	4/15/0
Fir, Dantzic, &c.	2/0/0	3/10/0
Oak, do.	3/0/0	5/0/0
Canada	5/0/0	7/0/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/10/0	5/0/0
Lath, D'ntzic, fath	5/5/0	6/10/0
St. Petersburg	5/10/6	7/10/0
Deals, Finland, 2nd & 1st std	10/10/6	10/10/0
Do, 4th & 3rd	7/10/0	8/10/0
Do, Riga	6/10/0	8/0/0
St. Petersburg, 1st yellow	11/0/6	15/0/0
Do, 2nd yellow	8/10/0	10/10/0
Do, white	7/10/0	10/10/0
Swedish	7/15/0	16/0/0
White Sea	8/10/0	18/0/0
Canada, Pine 1st	20/0/0	26/0/0
Do. do. 2nd	14/10/0	16/10/0
Do. do. 3rd, &c.	8 5/0	10/10/0
Do. Spruce. 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd	6/15/0	8/0/0
New Brunswick	7/0/0	7/10/0
Battens, all kinds	3/10/0	15/10/0
Flooring Boards, sq., 1 in. prep. 1st	0/8/6	0/14/6
Do. 2nd	0/7/6	0/11/3
Other qualities	0/5/0	0/8/0
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/2½	/4
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4½	2/0
Mexican do. do	/4	/5
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	15/0/0
Rose, Rio	10/0/0	20/0/0
Bahia	9/0/0	18/0/0
Satin, St. Domingo ..ft.	0/0/8	0/1/3

TIMBER (*continued*).		
Satin, Porto Rico	0/0/8	0/1/6
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
IRON—Pig, in Scotland ton	2/3/0	2/3/1½
Bar, Welsh, in London	6/0/0	6/10/0
Do. do. at works in Wales	5/10/0	6/0/0
Do. Staffordshire, in London	6/5/0	6/15/0
COPPER—British, cake and ingot	47/0/0	47/10/0
Best selected	48/0/0	49/0/0
Sheets, strong..	57/0/0	58/0/6
Chili, bars	44/6/3	44/13/9
YELLOW METAL lb.	0 0/5½	0/0/5¾
LEAD—Pig, Spanish ton	10/12/6	0/0/0
English, com. brands	10/15/0	10/17/6
Sheet, English, 3 lbs. per sq. ft. and upwards	12 15/0	0/0/0
Pipe	13/5/0	0/0/0
ZINC—English sheet ton	25/5/0	0/0/0
Vieille Montagne	25/15/0	0/0/0
TIN—Straits	88/17/6	89/0/0
Australian	89/0/0	89/2/6
English Ingots	92/10/0	92/15/0
OILS.		
Linseed ton	18/17/6	19/2/6
Cocoanut, Cochin	25/15/0	26/0/0
Do. Ceylon	23/0/0	0/0/0
Palm, Lagos	23/0/0	0/0/0
Rapeseed, English pale	26/10/0	0/0/0
Do. brown	24/15/0	0/0/0
Cottonseed ref.	17/15/0	18/0/0
Oleine	0/0/0	0/0/0
Lubricating, U.S.	4/10/0	5/10/0
Do. refined	5/0/0	10/0/0
TAR—Stockholm barrel	0/19/0	1/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *noon on Thursdays.*]

BELPER.—Accepted for the construction of a brick-service reservoir, laying water mains, &c., at Duffield, for the Rural Sanitary Authority. Mr. W. H. Radford, C.E., Angel-row, Nottingham. Quantities by Mr. W. H. Radford:—

Iron Pipes—Stanton Iron Works Company, Limited, near Nottingham £1,395 0 0
General Contract—G. F. Todd, Derby 1,368 0 0

BLACKWOOD (Mon.).—For the construction of a new road at Rhiw-sir-David, for the Mynyddislwyn Highway Board. Mr. Seth Phillips, Surveyor, Pantycelyn, Pontllanfraith, Mon.:—

Goldsworthy	£297 0 0	James Thomas	£132 10 6
Rees Morgan	150 5 6	Wm. Lewis, Bargoid*	125 0 0

* Accepted.

BRIGHTON.—For alterations to Chatfield's Hotel, West-street, Brighton. Messrs. Dorey & Carden, architects:—

Patching & Sons	£430 0	Wilson	£419 0
Taylor	420 0	V. P. Freeman	396 0
J. J. G. Saunders	419 10	C. & F. Cheesman*	393 0

* Accepted.

BRISTOL.—For the erection of the "White Swan" hotel, Bristol. Mr. W. P. Gingell, architect, Bristol. Quantities by Mr. A. Barratt, Bristol:—

H. A. Forse	£3,475	Robertson	£3,126
Neale Bros.	3,330	Stephens, Bastow, & Co.	3,098
Veals	3,320	G. Humphreys	3 090
E. Walters	3,300	E. Love	2,985
Easterbrook & Son	3,290	R. Wilkins & Son	2,944
Corolin & Son	3,143	T. H. Brown	2,725
E. T. Hatherly	3,137	J. Perkins (accepted)	2,665

[All of Bristol]

CARDIFF.—For the construction of a sewer and formation of new roads, Romilly-crescent, Canton, for the Canton Land Syndicate. Messrs. Veall & Sant, architects, 6, Arcade-chambers, High-street, Cardiff. Quantities by the architects:—

H. & F. Osmond	£343 8 6	Wm. Symonds	£290 0 0
T. Jones Davies	292 14 2	Thos. Rees (accepted)..	275 8 3

[All of Cardiff.]

DURHAM.—For the alteration and enlargement of East Hetton Board School, for the Coxhoe School Board. Mr. John Henry, architect, 11, North Bailey, Durham. Quantities by the architect:—

Lodge & Sons	£630 0 0	M. R. Draper	£533 2 0
W. Grainger	604 6 0	J. Heslop	519 7 0
J. Shepherd	545 0 0	Bell & Sanderson, Coxhoe (accepted)	500 0 0
Elliott & Lazenby	544 19 0		

HATCHAM (Surrey).—For the erection of St. Catherine's Church, Hatcham. Messrs. Stock, Page, & Stock, architects, 9, Denman-street, London Bridge, S.E. Messrs. Widnell & Trollope, surveyors, Westminster:—

Peto Bros.	£23,170	H. L. Holloway	£21,680
Stimpson	23,050	Dove Bros.	21,455
Stephens, Bastow, & Co.	22,999	B. E. Nightingale	21,390
W. Downs	22,820	Brown, Son, & Blomfield	20,850
S. & W. Pattinson	22,534	Goddard & Son	20,835
T. Rider & Son	21,928	Rudd & Son	20,400
Collins	21,786	Higgs & Hill	19,984
S. J. Jerrard	21,779		

HORNSEY.—For new schools, &c., at Frobisher-road, Hornsey, for the Hornsey School Board. Mr. Chas. Bell, architect. Quantities by Mr. Hy. Lovegrove:—

	Total.		
Anley	£23,027	*£151	†£1,965
Payne & Son	22,926	100	463
Bryan & Son	22,813	725	1,385
Rowe Bros.	22,788	300	1,400
Lawrence & Sons	22,012	153	2,195
J. W. Dixon	21,999	80	1,775
B. E. Nightingale	21,776	162	1,720
B. G. Batley	21,691	110	1,375
Maddox Bros.	21,649	150	2,100
Allen & Son	21,259	175	1,800
C. Dearing & Son	21,229	450	2,000
Holliday & Greenwood	21,137	—	1,977
Tenburg	21,076	163	1,564
Hepwell	19,300	165	1,450
Coxhead	19,229	243	1,130
C. Wall, Chelsea (accepted)	18,833	165	1,411
F. Stevens	17,308	183	993

* Less for York stone instead of granite.
† Extra for cream-coloured glazed bricks over stock brick.

LEEDS.—Accepted for the erection of a butcher's shop and two cottages, at Lofthouse, for the Leeds Industrial Co-operative Society, Limited. Mr. W. A. Hobson, architect, 82, Albion-street, Leeds:—

Brick and Mason.—John Binks, Outwood	£315 0 0
Joiner.—Wm. Holmes, Lake Lock	106 10 0
Plasterer.—Rd. Heslop, Armley	18 19 6
Plumber.—G. Wilson, Rothwell	15 15 0
Slaters.—J. Atkinson & Son, Leeds	22 0 0
Painter.—R. Watkin, Rothwell	7 0 0
	£485 4 6

LEWES.—For the erection of a police station and petty sessional room at Hurst Green, for the East Sussex County Council. Mr. Henry Card, County Surveyor, Lewes:—

J. & T. Daniels	£2,046 2 0	Taylor Bros.	£1,843 0 0
F. Piper	1,999 10 0	H. Knock	1,720 0 0
A. Comport	1,960 0 0	P. Peters, Horsham*	1,680 0 0
A. W. Nunn	1,919 0 0		

* Accepted.

LONDON.—For a workhouse for 1,000 aged and infirm inmates at East Dulwich, for the Guardians of the Poor of the parish of Saint Giles, Camberwell. Messrs. Wilson, Son, & Aldwinckle, architects, 1, Victoria-street, S.W. Quantities supplied by Mr. R. C. Gleed, 5, Adelaide-place, London Bridge, E.C.:—

Garlick & Horton	£77,640	H. Kellett	£66,457
Reed, Blight, & Co.	72,777	H. L. Holloway	66,215
W. Brooks	72,079	J. Allen & Sons	65,888
Balsam Bros.	71,806	Leslie & Co.	65,264
J. T. Chappell	69,420	Braide & Co.	65,000
Lawrance & Son	68,040	Kirk & Randall	61,928
R. Ballard	67,600	F. & H. F. Higgs*	61,000

* Accepted.

LONDON.—For the erection of business premises and printing works at Tower-hill, E.C., for Messrs. Chas. Skipper & East. Messrs. Beazley & Burrows, architects, 17, Victoria-street, S.W. Quantities by Messrs. Pryce, Cuxson, & Leigh:—

Higgs & Hill	£36,980	Lovatt	£35,209
Paramor & Sons	36,358	Mowlem	34,877
Bywaters	35,902	Morter*	34,232
Ashby & Horner	35,761	Patman & Fotheringham*	33,900
Holloway Bros.	35,266	Grover & Sons	33,291
Nightingale	35,232	Boyce	32,400

* Too late.

LONDON.—For the erection of a Public Library, Church-street, Stoke Newington, for the Library Commissioners. Messrs. H. H. Bridgman & Goss, architects, 42, Poultry, E.C.:—

Clark & Bracey	£3,262	Ashby Bros.	£2,790
J. Stapleton	3,218	Neave & Neave	2,770
Josolyne & Young	2 993	Wm. Shurmur	2,745
T. Emmett	2,837	S. R. Lamble	2,729
Harris & Wardrop	2,836	Godfrey & Son	2,697
E. Toms	2,793	Wm. Dabbs (accepted)	2,648

LONDON.—Accepted for alterations to stables, and building loose-box, coach-house, and open shed, at Balham, for Mr. Cooke:—
W. Lang, Grove-road £140 0 0

LONDON.—Accepted for rebuilding the "Prince William Henry" public-house, Blackfriars-road, S.E. (exclusive of sundry fittings), for Mr. W. H. Burney. Mr. W. M. Brutton, architect, 171, Queen Victoria-street, E.C.:—
Romaine & Co. £2,500 0 0

LONDON.—For alterations to the "Rose and Crown" public-house, Collingwood-road, S.E., for Mr. J. Hall. Mr. W. M. Brutton, architect, 171, Queen Victoria-street, E.C.:—

J. Mills	£469	Pritchard & Renwick	£342
C. Ansell	449	Whitehead & Co. (accepted)	340

LONDON.—For alterations to the "Pilgrim" public-house, Upper Kennington-lane, S.E., for Messrs. Grimes & Co. Mr. W. M. Brutton, architect, 171, Queen Victoria-street, E.C.:—

Burman & Sons	£345	Pritchard & Renwick*	£284
Edwards & Medway	335		

* Accepted.

LONDON.—For the erection of a warehouse, Gold Hawk-road, Shepherd's-bush, W. Mr. J. H. Richardson, architect. Quantities by Mr. Henry Lovegrove:—

Brass & Son	£3,188	Adamson & Son	£2,675
Swan	3,163	Chamberlen Bros.*	2,672
Kirk & Randall	2,723	Tennant & Co.	2,645
Marks	2,690		

* Accepted.

LONDON.—For the erection of Pope's Laundry, Shepherd's-bush. Mr. J. H. Richardson, architect. Quantities by Mr. H. Lovegrove:—

Chamberlen Bros.	£615	Lyford	£520
Heyward	582	Mander	509
Toms	568		

LONDON.—For alterations and additions to "Foulden Lodge," Clapton, for Dr. Frederick Wallace. Mr. W. A. Finch, architect, 76, Finsbury-pavement, E.C.:—

Thomerson & Son	£598 10	A. Porter	£496 0
Godfrey & Son	514 0	J. Hicks, Stamford-hill,	
Jarvis & Son	499 10	N. (accepted)	478 0

LONDON.—For alterations, &c., to the "Adelphi Stores," 75, Strand, W.C., for the Brewery Assets Corporation, Limited. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—

F. Mark	£1,089	R. Plummer	£865
Edwards & Medway	1,072	Charles Dearing & Son, Islington (accepted)	860
Patman & Fotheringham	1,054		

LONDON.—Accepted for alterations, &c., to the "Prince's Head," Buckingham-street, Strand, W.C., for the Brewery Assets Corporation, Limited. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—
Edwards & Medway, Kennington-cross £670

LONDON,—Accepted for alterations, &c., to the "Moorgate," Moorgate-street, E.C., for the Brewery Assets Corporation, Limited. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—
R. Plummer, City £724

LONDON.—Accepted for alterations, &c., to the "Cannon," Cannon-street, for the Brewery Assets Corporation, Limited. Mr. H. I. Newton, architect, 49, Victoria-street, Westminster, S.W.:—
R. Plummer, City £550

LONDON.—Accepted for alterations, &c., to the "Opera," Haymarket, S.W., for Miss Farmer. Mr. H. I. Newton, architect, 49 Victoria-street, Westminster, S.W.:—
Edwards & Medway, Kennington-cross £977

LONDON.—Accepted for re-building No. 6, Old Jewry. Mr. Delissa Joseph, architect, 17, Basinghall-street:—
G. H. & A. Bywaters £10,680 0 0

LONDON.—Accepted for building the Hampstead Synagogue. Mr. Delissa Joseph architect, 17, Basinghall-street:—
John Allen & Sons £9,162 10 0

LONDON.—For decorative, sanitary, and structural works at the Chief Rabbi's residence, 22, Finsbury-square. Mr. Delissa Joseph, architect, 17, Basinghall-street:—

Clarke & Mannooch	£625	C. F. Kearley (accepted)	£517

LONDON.—For building a studio at the rear of No. 2, Hanover-terrace, Regent's Park, and for decorative, sanitary, and structural work to No. 2, Hanover-terrace. Mr. Delissa Joseph, architect, No. 17, Basinghall-street:—

Studio.

A. W. Hammond	£277	Prestige*	£248
Watson	257		

* Accepted.

Decorative Work.
Hackforth (accepted) £122 0 0

Sanitary and Structural.
Clarke & Mannooch (accepted) £286 0 0

LONDON.—For the construction of the Hackney-wick, &c., relief sewer, for the London County Council. Mr. A. R. Binnie, Engineer:—

J. Mowlem & Co.	£53,221 0 6	G. Pauling	£37,105 7 9
T. Adams	45,484 5 6	E. & W. Iles	36,600 0 0
J. Dickson	41,640 8 6	F. D. Bentley	31,046 14 0

LONDON. — For the erection of a Fire Brigade Station at East Dulwich, for the London County Council. Mr. Thomas Blashill, Architect:—

J. Garrett & Son	£14,080	Scharien & Co.	£11,427
Stimpson & Co.	11,540	G. Munday & Son	10,480

LONDON.—For the erection of a caretaker's lodge in St. Pancras-gardens, for the Works Committee of the Vestry:—

Vernall & Griffith	£1,093 0	Steed	£788 0
Toms	888 0	Scrivener & Co.	771 0
Bangs	870 0	Wall & Co.	750 15
Gould & Brand	814 0	Rowe Bros., Camden Town (accepted)	697 0
Drew	799 0		

NORTH CRAY (Kent).—For repairs to "Ruxley" farm-house, North Cray, Kent. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C.:—

R. A. Lowe	£311 15	H. Marchant	£220 0
Somerford & Son	259 0	C. F. Stebbings, Sidcup*	180 0
T. Knight	241 0		

* Accepted.

NOTTINGHAM.—For the completion of Industrial Art Gallery, &c., at Nottingham Castle. Mr. Herbert Walker, C.E., architect, Nottingham:—

Hodson & Sons	£1,981 10	F. Evans	£1,927 0
Bell & Sons	1,952 0	J. Hutchinson	1,900 0
W. Woodsend	1,948 10	T. Fish & Sons	1,894 0
H. Vickers	1,930 0	J. G. Thomas (accepted)	1,833 0

[All of Nottingham.]

ORPINGTON.—For decorative repairs and re-instatements to private residences at Chelsfield-road, Orpington, Kent. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C.:—

F. Wood	£247	D. Payne	£169
R. A. Lowe	200	Somerford & Son, Orpington*	159
Stebbings & Pannett	192		
W. B. Taylor	170		

* Accepted.

READING.—For alterations to the Corn Exchange and Market Passage, for the Corporation of Reading. Mr. Arthur E. Collins, Borough Engineer and Surveyor:—

Bottrill & Son	£2,798	Winter & Fitt	£2,592
G. H. Tucker	2,788	T. H. Kingerlee, Oxford*	2,527

* Accepted.

READING.—For warming the Corn Exchange by hot water. Mr. Arthur E. Collins, Borough Engineer and Surveyor :—

Jones & Attwood	£385 0 0	Hart & Sons.....	£312 12 4
Williams & Sons.....	373 10 0	E. Margrett.....	294 10 0
J. G. Spencer	335 17 0	G. H. Tucker, Reading*	287 7 0

* Accepted.

READING.—For laying wood block floor in the Corn Exchange. Mr. Arthur E. Collins Borough Engineer and Surveyor :—
Wood Block Flooring Co. (accepted) £160 0 0

RHYL.—Accepted for the construction of a new public cemetery at Penymaes, for the Improvement Commissioners. Mr. Robt. Hughes, Town Surveyor, Rhyl :—
Excavating for Roads, &c.—Jones & Roberts, Rhyl £177 2 9
Lodge, Entrance Gates, Front Walls, &c.—Jones & Roberts, Rhyl 661 10 0
Wrought-iron Unclimbable Railings and Fixing.—Economic Fencing Co., Billiter House, E.C.. 111 10 0
Drainage.—Isaac Hughes, Rhyl..... 249 7 3

SOUTHAMPTON.—For re-building shop and premises, No. 23, Above Bar, Southampton, for Messrs. G. A. Permain & Co. Mr. William Burrough Hill, architect, Southampton :—

Wright & Son	£2,578 3	Stevens & Co.	£2,077 0
Udall & Co	2,220 0	Hinton	2,050 0
Sanders	2,198 0	Crook & Son	1,983 0
J. Bull, Sons, & Co., Ltd.	2,130 0	Cawte*	1,922 0
Morgan, Isted, & Morgan	2,086 0		

* Accepted.
[All of Southampton.]

SOUTHAMPTON.—For rebuilding shop and premises, No. 62, High-street, for Mr. Edward Cox. Mr. William Burrough Hill, architect, Southampton :—

Sanders	£774 0	Rowland & Son	£699 12
Morgan, Isted, & Morgan	736 0	Crook & Son	648 10
H. Stevens & Co.	735 0	Watt*	557 10
Hinton	730 0		

* Accepted.
[All of Southampton.]

SOUTH SHIELDS.—For the erection of a dwelling-house, for Mr. Hendry, Baring-street, South Shields. Mr. Henry Grieves, architect, Albany-chambers, South Shields :—

Goodwin & Son	£594 0 0	J. W. Robertson.....	£530 0 0
S. Sheriff	575 0 0	Wm. Scott	484 10 0
Wm. Winter	565 0 0	J. Ross (accepted)	453 19 6

[All of South Shields.]

WEST HARTON (South Shields).—For the erection of the Victoria Hotel, West Harton, for Mr. Matthew Wood. Quantities by Messrs. Boreham & Morton, Sunderland. Mr. Henry Grieves, architect, Albany-chambers, South Shields :—

S. Sheriff	£2,072 16 5	R. Summerbell, Tyne Dock*	£1,783 0 0
R. Allison	2,046 13 1	Wm. Scott	1,768 3 6
Storar & Son	1,978 0 0		
Jas. Young	1,800 8 0		

* Accepted.

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M. & Co.—T. D. M'C. (the question is a legal one, and must depend mainly on the terms of the lease).—"Architect" (no name enclosed, and we have reason for doubting whether the writer has a claim to that signature).—R. H. R.—F. R. F. (thanks).

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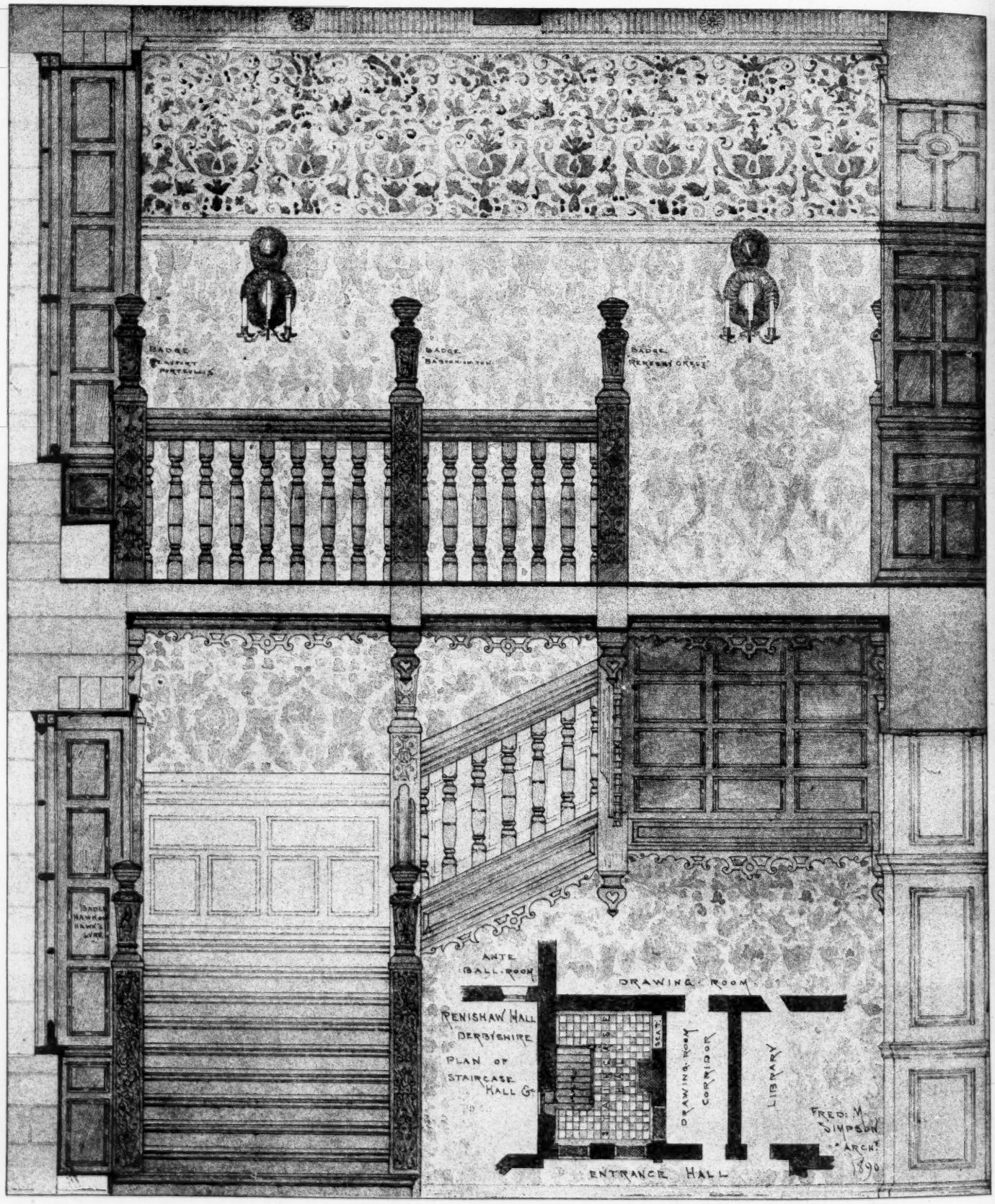
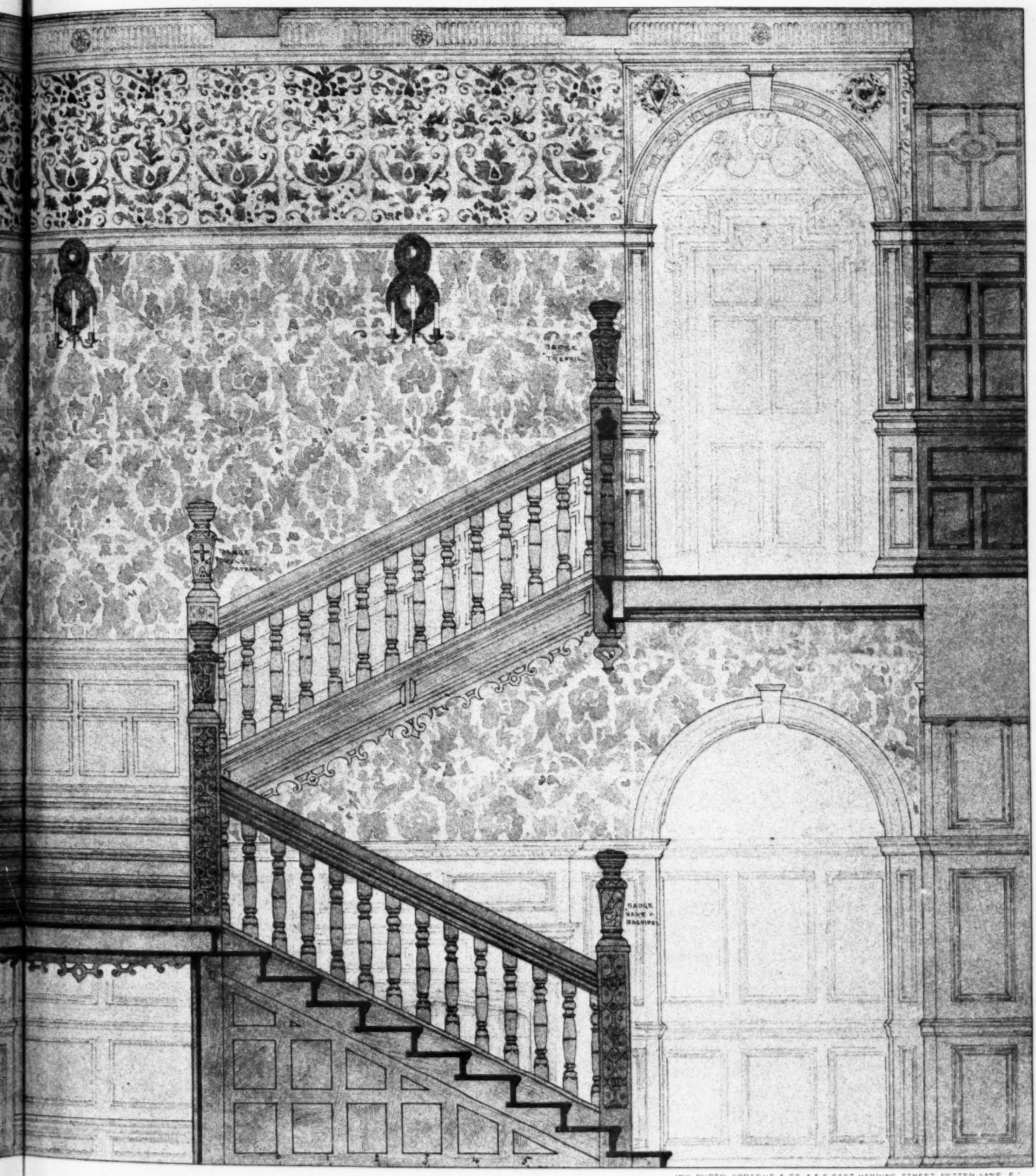


STAIRCASE: RENISHAW HALL, DERBYSHIRE.

Royal Academy Exhibition, 1890.



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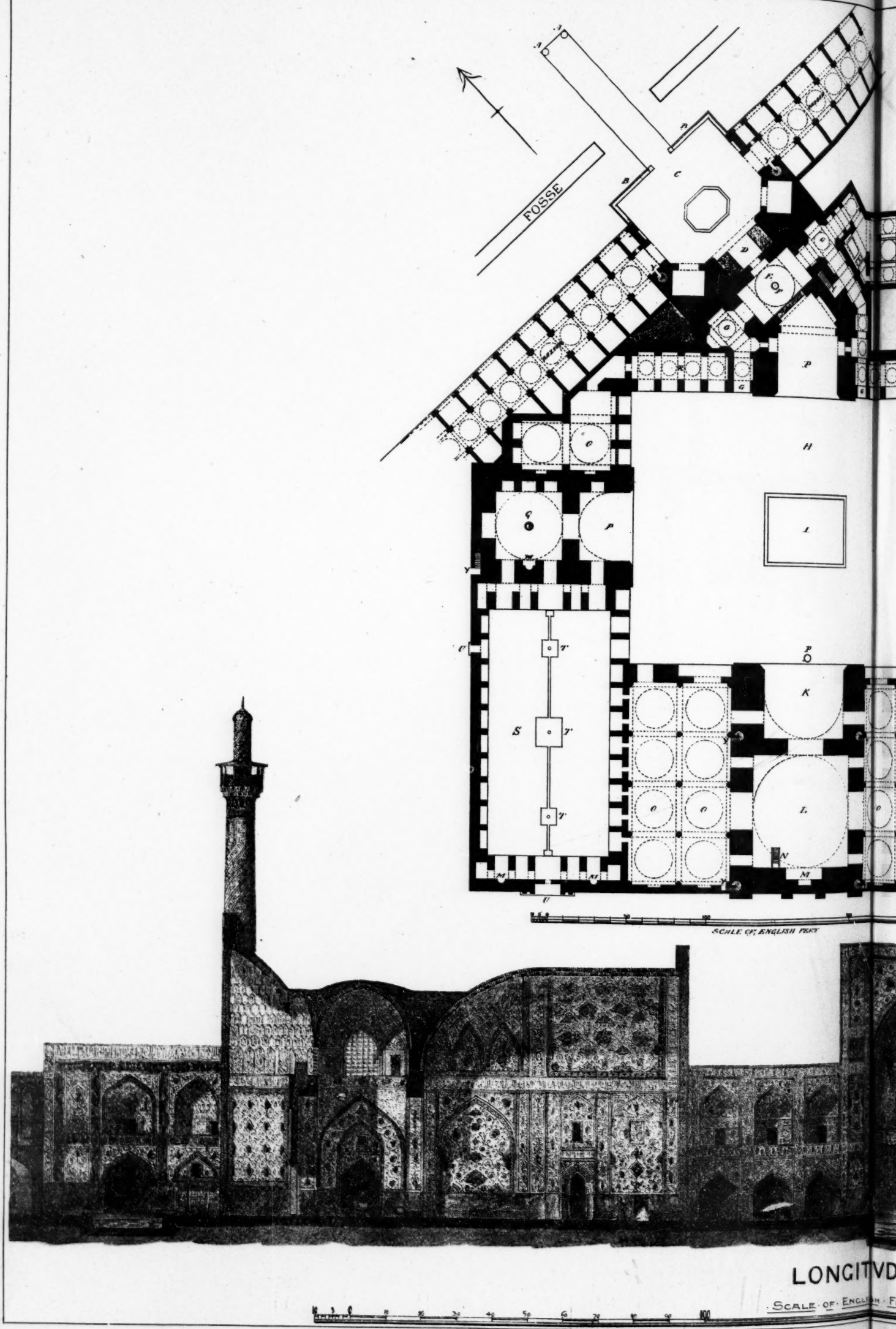
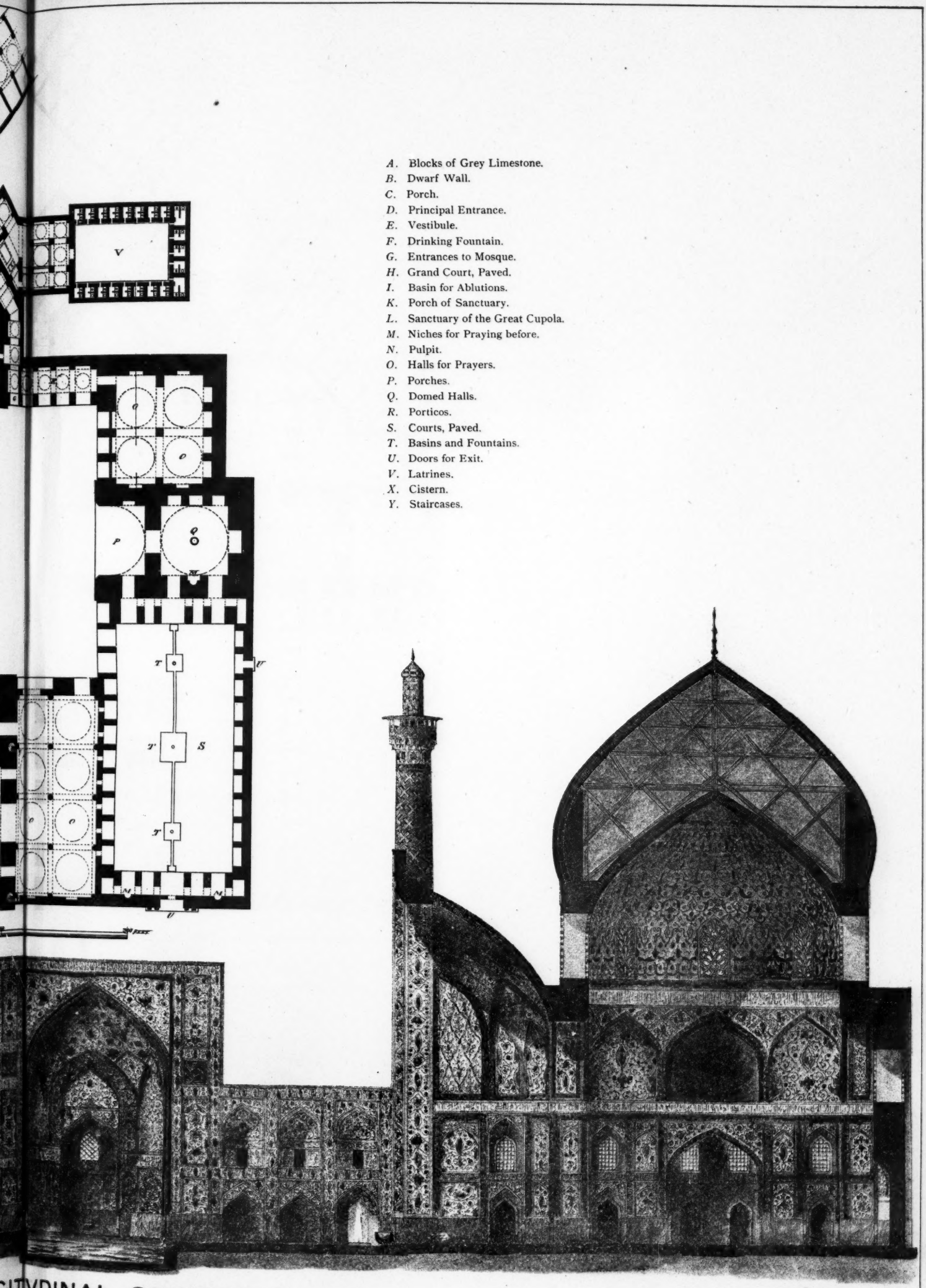


MOSQUE OF SHAH ABB

(In illustration of Professor Atchison's

A. Blocks of Grey Limestone.
B. Dwarf Wall.
C. Porch.
D. Principal Entrance.
E. Vestibule.
F. Drinking Fountain.
G. Entrances to Mosque.
H. Grand Court, Paved.
I. Basin for Ablutions.
K. Porch of Sanctuary.
L. Sanctuary of the Great Cupola.
M. Niches for Praying before.
N. Pulpit.
O. Halls for Prayers.
P. Porches.
Q. Domed Halls.
R. Porticos.
S. Courts, Paved.
T. Basins and Fountains.
U. Doors for Exit.
V. Latrines.
X. Cistern.
Y. Staircases.



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NGLISH FEET.

200 300ft

SHAH ABBAS, ISPAHAN.

sor Aitchison's Royal Academy lectures.)

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Hanover Schools
Gilbert St. Grosvenor Sq. W.
W.D. Caröe M.A. Arch. 1888

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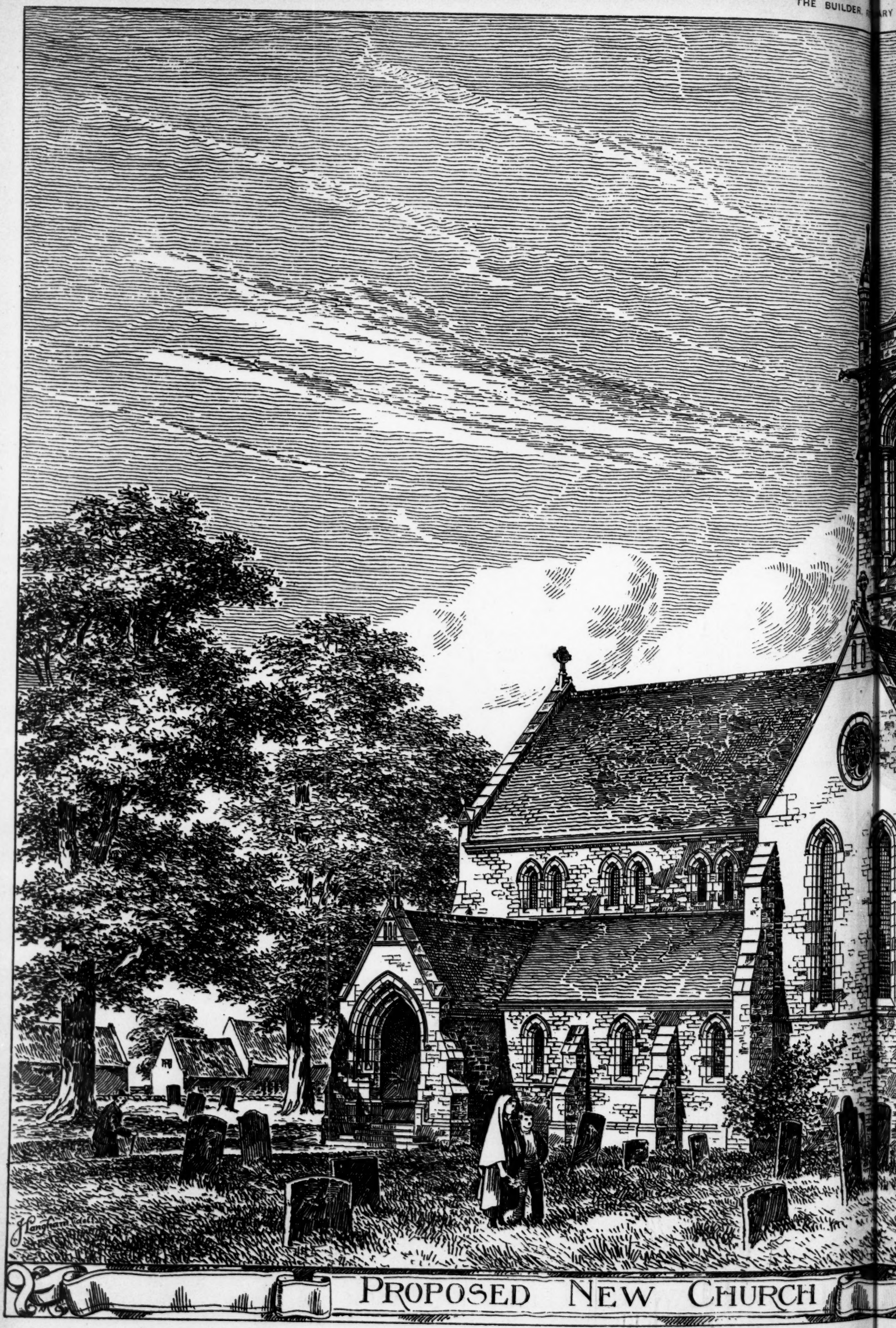
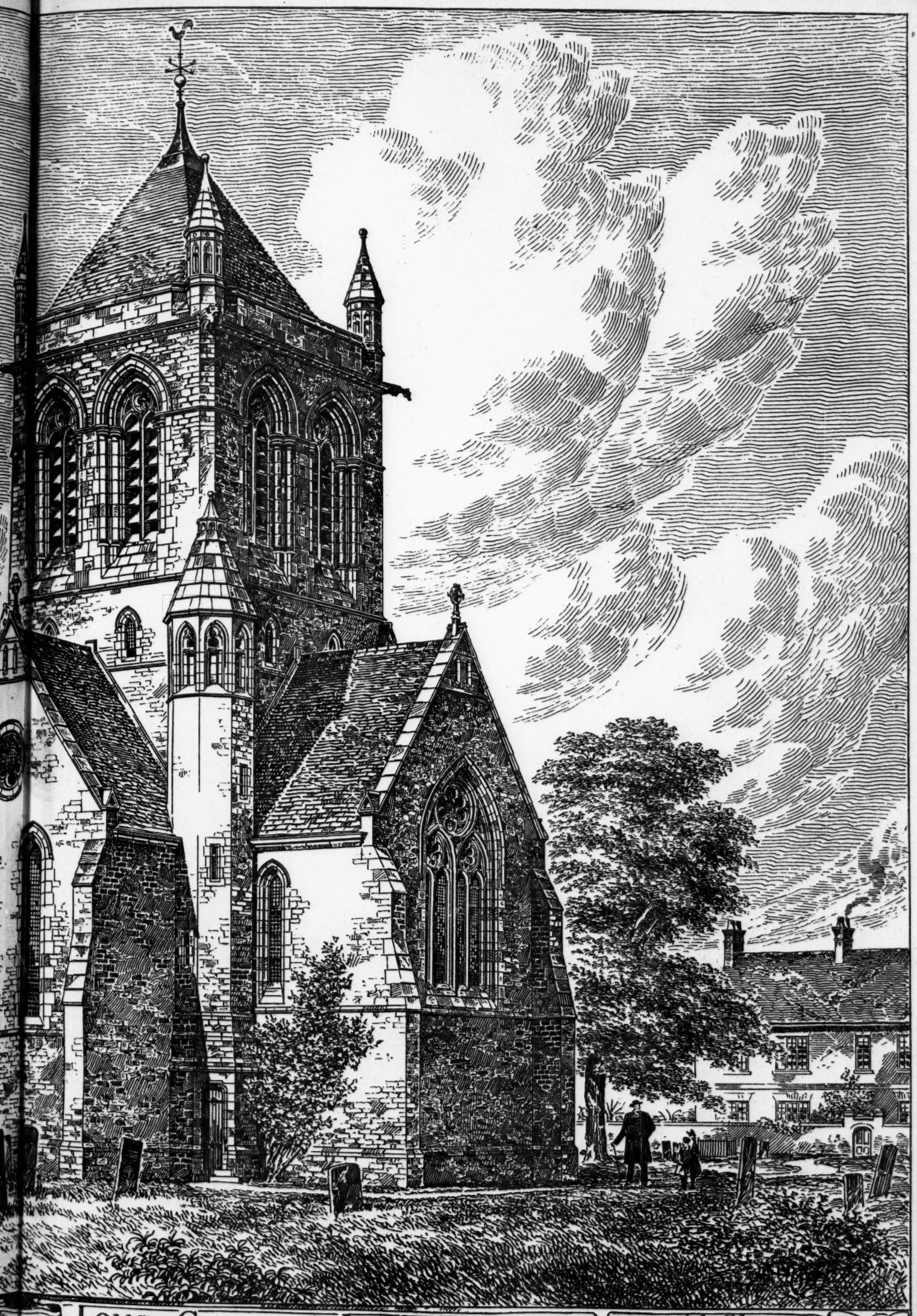


PROPOSED NEW CHURCH



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John Howitt
Architect
Nottingham

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